PRACTICE ABSTRACT NO. 11

Designing mixtures to suppress airborne pathogens

Problem

Pathogens spread easily among genetically uniform plants (Fig. 1 top left). Adaptation leads to resistance breakdown and loss of valuable varieties.

Solution

Grow mixtures of varieties or species that differ in their resistance to air-borne pathogens (Fig. 1 lower left).

Outcome

Pathogens are slowed down and less likely to adapt to all mixture components. Pesticide use is reduced, and varieties will be useful for a longer time.

Applicability box

Geographical coverage

Worldwide

Application period

All the times

Required time

Setting up of mixtures

Period of impact

Year round

Equipment

Potentially equipment o mix seeds or to separate the harvested goods

Practical recommendations

- Variety mixtures: use varieties that can be harvested and used together but that differ in their resistance to the pathogen in focus. Because over time the pathogen may adapt to more than one resistance (Fig. 1 lower right) change the mixture and resistance composition over time.
- Species mixtures: use species that are not susceptible to the same pathogen. Choose species that either can be grown and used together (e.g. for feed) or that are easily separated (e.g. with different seed sizes). Alternatively use a service species (e.g. undersown) in addition to the species to be harvested. In Species mixtures there is less risk for pathogens adapting. If species mixtures are too difficult, strip intercropping of different species is a good option.

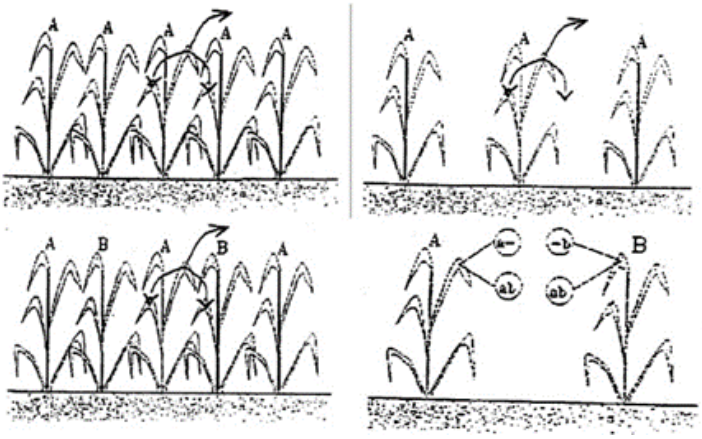

Figure 1: *Top left*: Field grown to variety A that is susceptible to pathogen race a. *Top right*: The distance between susceptible plants A is increased. *Lower left*: Space between plants of Variety A filled with variety B, resistant to race a. Resistant plants will act as barriers. *Lower right*: Race a cannot attack variety B and race b cannot attack variety A. However, race ab can attack both varieties

Practical testing/ Farmers' experiences

Variety mixtures of cereals work very well against rusts, mildew and Septoria tritici, or rice blast in rice. Similarly species mixtures of cereals with beans or peas usually reduce air borne pathogens in both crops. Undersowings of clover in cereals can reduce Septoria.

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Further information

- Finckh, M. R., van Bruggen, A.H.C., Tamm, L. (2015). Plant Diseases and their Management in Organic Agriculture. St. Paul, MN, APS Press
- Video on you Tube: .....
- Wiki: http://vm193-134.its.uni-kassel.de/En.DiversiWiki/index.php/Diseases_in_Diverse_Cropping_Systems
- Check the Organic Farm Knowledge Platform for more practical recommendations.

About this abstract

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Publisher: IFOAM EU, Rue du Commerce 124, BE-1000 Brussels www.ifoam-eu.org
Date: 19/04/2020
ReMIX is a H2020 multi-actor project that will allow designing cropping systems based on agro-ecology for the benefit of farmers and the whole EU agricultural community. ReMIX will exploit the benefits of species mixtures to design more diversified and resilient agro-ecological arable cropping systems. Based on a multi-actor approach, ReMIX will produce new knowledge that is both scientifically credible and socially valuable in conventional and organic agriculture. The project will tackle practical questions and co-design ready-to-use practical solutions. The project will span from the specification of end-user needs and the co-design of in-field and on-farm experiments to demonstrations with evaluation of new varieties and practices. ReMIX will contribute to the adoption of productive and resilient agricultural systems. The project is running from May 2017 to April 2021
Website: www.remix-intercrops.eu

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