

## Projekte im ORDIAmur-Verbund

No.	Title of the sub-project	Supervisor
P1	Maintenance of experimental plots and testing of management methods to overcome ARD <sup>1</sup>	Dr. A. Wrede, LKSH
P4	ARD severity testing and management of apple orchards at regional-scale	Prof. Dr. E. Lehndorff, UBT
P5	Role of spatial organization for the occurrence of ARD – low mobility as a key to develop management strategies	Prof. Dr. D. Vetterlein, UFZ
P7	Validation of candidate genes of apple on different soils and after application of different countermeasures to verify their usefulness as biomarkers	Prof. Dr. H. Flachowsky, JKI
P8	ARD-associated fungi detection and application of beneficial fungal species	Dr. S. Kind, JKI
P9	Bacterial endophytes in apple roots: Indicators for ARD severity	Prof. Dr. T. Winkelmann, LUH
P10	Increasing ARD suppressive potential of soils by inoculants and soil amendments through microbiome modulations	Prof. Dr. K. Smalla, JKI
P11	Use of inoculants with biostimulant properties for the mitigation of ARD	Prof. Dr. M. Schloter, HMGU
P12	Nematodes and associated fungi involved in replant disease	Dr. H. Heuer, JKI
P15	The role of farmer risk behavior and risk perception for adopting novel ARD management options	Dr. B. Hardeweg, HTWD
P17	Exploiting phytoalexins as ARD indicators	Dr. B. Liu, TUBS
PK	Project coordination	Prof. Dr. T. Winkelmann, LUH

BonaRes is short for “Soil as a sustainable resource for the bio-economy” and is a funding initiative of the German Federal Ministry for Education and Research (BMBF) within the scope of the National Research Strategy Bio-economy 2030. The BonaRes center for soil science coordinates the funded research networks.

<http://www.bonares.de>



GEFÖRDERT VOM



Bundesministerium  
für Bildung  
und Forschung

### Contact

#### BonaRes (Module A): ORDIAmur

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### Coordination team

#### Project manager

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#### Vice project managers

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#### Scientific coordinator

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BonaRes (Module A)

ORDIAmur

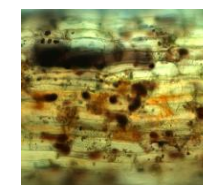
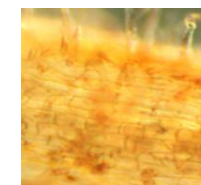
## Overcoming Replant Disease by an Integrated Approach

Phase III (2022 – 2025)

healthy soil



diseased soil



Pictures: T. Winkelmann, G. Grunewaldt-Stöcker

[www.ordiamur.de](http://www.ordiamur.de)

ordiamur = lat.: let's get started

<sup>1</sup>ARD: apple replant disease

## Soil as a sustainable resource (BonaRes)

Fertile soils are the central resource for producing food and other biomass. The world's population will grow to about 9 billion over the next 30-40 years but the land cover for global food production is limited. To ensure food supply, global land productivity must therefore be increased by 60 % until 2050. As part of the BMBF funding initiative BonaRes, strategies have to be developed to manage soils from a bio-economic point of view and at the same time make them more productive.

The ORDIAmur project is investigating apple replant disease (ARD). The 12 projects (see back page) are structured in four work packages (Fig. 1). The joint project ORDIAmur aims at developing sustainable means to overcome ARD.

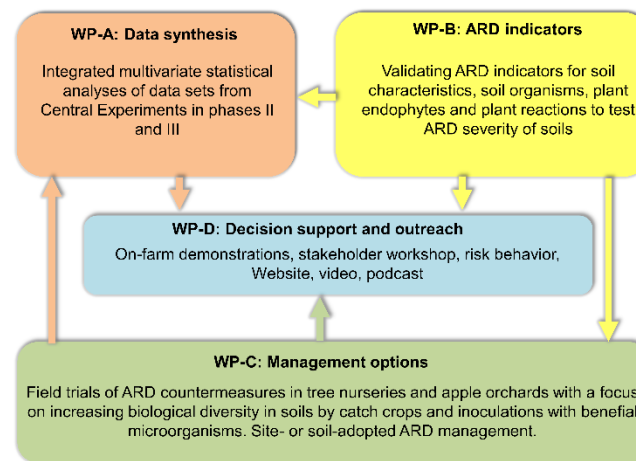


Fig. 1: Structure of the ORDIAmur network

## Apple replant disease

Replant disease ("soil sickness") in apple and other plant species has long been known but, however, it is barely understood scientifically. In case of repeated replanting, the soil loses its ability to serve plants of the same species as a substrate for producing constantly high yields. If the soil is not disinfected the replant disease can persist 20 to 30 years. However, common disinfection methods are based on thermal and chemical processes which are complicated, expensive and ecologically controversial or no longer permitted. The findings of ORDIAmur on the etiology of replant disease will be used to derive urgently needed management measures in order to overcome the problem and to restore soil health.

The following progress and findings were made during the first project phases:

- Biotest for the detection of apple replant disease.
- Evidence of local expression and immobility of apple replant disease (Fig.2)
- Significantly altered structural and functional composition of the soil biota in replant diseased soil
- Indicators for apple replant disease based on soil properties, microorganisms in soil and root, nematodes, root microscopy and biochemistry
- Testing of control measures on farms



Fig. 2: Root formation of apple in healthy and diseased soil (Picture: K. Smalla/D. Vetterlein)

## Project partner

- Gottfried Wilhelm Leibniz Universität Hannover (LUH)
- Julius Kühn-Institut (JKI)
- Helmholtz-Zentrum München GmbH (HMGU)
- Helmholtz-Zentrum für Umweltforschung (UFZ)
- Technische Universität Braunschweig (TUBS)
- Landwirtschaftskammer Schleswig-Holstein (LKSH)
- Universität Bayreuth (UBT)



## Associated partner:

- Dienstleistungszentrum Ländlicher Raum Rheinland Pfalz (DLR-RP)
- LMS Agrarberatung



Joint meeting of the ORDIAmur network, Dresden (18.09.2019)