

# **Company Deck**





Soil-Grown Root Phenotyping Platform

## About PhenoRoot Company and Services



- PhenoRoot Ltd. is an agricultural company that provides analysis services for soil-grown plant root systems (root phenotyping).
- PhenoRoot utilizes its technology to provide R&D services to leading seed and agrochemical companies and research institutes.
- We intend to provide our customers with our phenotyping platform for operation on the customer's premises.



# We scan the roots at different developmental stages, for monitoring and analyzing signs of stress and diseases.



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# **Our Technology**





We scan the root systems from different angles to understand the full complexity of the 3D architecture.

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# **Our Technology**



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# Extracted Traits of the Root System Architecture (RSA)

The measured root parameters guide the selection of roots with optimal agronomic properties, facilitating targeted choices for root-focused breeding initiatives.

- Biomass
- Volume
- Depth
- Width
- Total Root Area
- Network Area
- Convex Area
- Perimeter
- No. of Roots
- No. of Root Tips

- Total Root Length
- Primary Root Length
- Lateral Root Length
- Lateral Root Branches
- Branching Angle
- Root Orientation
- Various Diameter Frequency
- Various Angle Frequency
- Root Nodules\*
- Nematodes knots\*
- (\*) Our AI-powered complex trait extraction



# **Our Customers**













האוניברסיטה העברית בירושלים THE HEBREW UNIVERSITY OF JERUSALEM



Ben-Gurion University of the Negev



Agricultural Research Organization Volcani Center











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#### **Crop Breeding**

The integration of root phenotyping into breeding programs is a pivotal strategy for developing the next generation of crops with superior root performance. Our platform empowers breeders to concentrate on root traits of agronomic importance and select genotypes with enhanced resilience to stressors such as drought, salinity, and soilborne diseases.

#### Agrochemicals

The application of agrochemicals, including fertilizers, biostimulants, and pesticides targeting soil-borne pathogens, often focuses on the root system. Efficient root phenotyping emerges as a crucial tool for screening new molecules and deepening our understanding of their mode of action and efficacy in the development of innovative and effective formulations.

## Academic Research

The benefits of root phenotyping in academic research are substantial. Our phenotyping platform provides a robust tool for the in-depth study of plant root systems, accelerating researchers with novel opportunities for basic and applied science in an unexplored area. This spans across genetics, physiology, and environmental science.



# **Crop Protection**

# AI-powered diagnostics of soil-borne diseases

We utilized our platform to create a deep learning-based algorithm for the automated, accurate, and rapid detection of root-knot nematodes.

Plant-parasitic nematodes pose a significant threat to global food security, causing damage to a wide range of crops and resulting in yield losses exceeding USD 170 billion globally.

Our technology aims to combat the risk of nematodes by enhancing the breeding of crop varieties with nematode resistance and the development of novel, efficient, and sustainable nematicides. Tagging



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Prediction



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## Breeding Wheat with Deeper Roots

Deeper roots are related to drought tolerance and increased grain yields.

In this project, we employed our platform to scan and analyze 1200 root systems from 200 wild-type wheat accessions.

GWAS was employed to identify candidate genes associated with deep rooting, which were then integrated into a cultivated wheat line to develop an improved variety.





#### Breeding cereals with improved nitrogen (N) uptake

Nitrogen (N) is a crucial element for crop production and the most widely used fertilizer.

Crops use only 50% of the applied N, while the rest is lost to the environment, polluting the water, soil, and air.

Enhancing N uptake by roots is critical strategy in crop improvement with economic and environmental advantageous.

Utilizing our platform, we identified wheat lines that developed large and deep roots under nitrogen deficiency, resulting in improved nitrogen uptake.



100%N <sub>Normal</sub>

Rice

10% N Deficiency 100%N Normal

10% N Deficiency

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Wheat This document is the property of PhenoRoot Ltd.

**Breeding Tomato Rootstocks for Stress** Tolerance

Plant roots are frontline responders to major environmental stress.

Improving the root system function plays a critical role in enhancing plant resilience in challenging environments.

In this study, we investigated root traits to provide quantitative data serving as a vital tool for breeding programs to improve tomato rootstock varieties.

# Rootstock 1 Rootstock 2 Rootstock 3



control

control

control

salinity

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# We used our platform to scan a variety of crop roots.





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