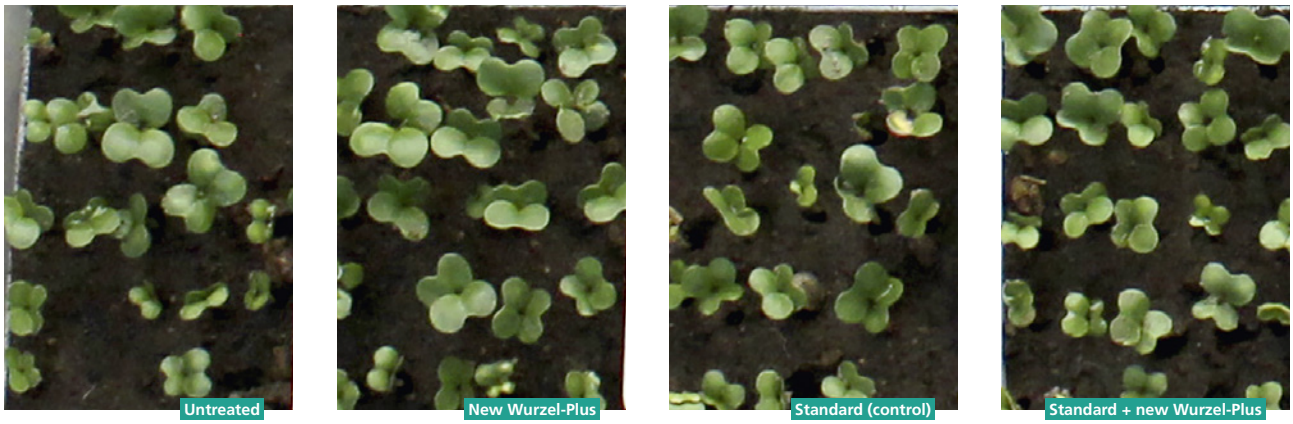
THE NEW GENERATION WURZEL-PLUS FOR OILSEED RAPE

The current challenges facing the agricultural industry require all the components of successful oilseed rape cultivation to mesh together perfectly. Outstanding genetics must be complemented by an intelligent approach to cultivation and a tailored seed treatment strategy



The RAPOOL Ring (an alliance of oilseed rape breeders) has its own Seed Technology working group which has been researching and developing new seed treatments for several years. As a result of this developmental work, RAPOOL launched the umbrella brand Wurzel-Plus (root-plus) product for winter rape in 2016. Biostimulants are tested from the laboratory to the field in combination with fungicidal and insecticidal treatments to obtain an optimally coordinated effect.

The first generation formulation of Wurzel-Plus comprised a carefully matched blend of macro- and micro-nutrients that had been tested in long-term field trials. This seed treatment formula stimulated root growth in young oilseed rape plants even when applied in small doses. Its mode of action was proven in most soils under both reduced fertiliser applications and local growing conditions.

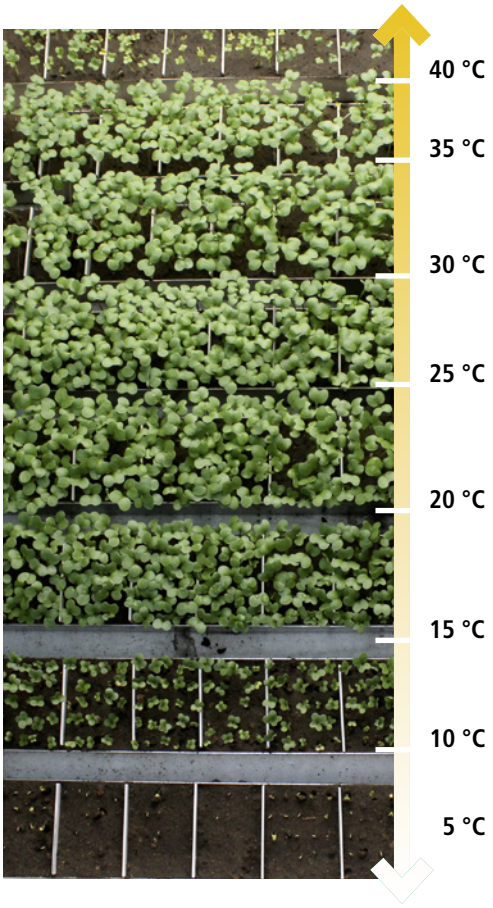
The new generation Wurzel-Plus was initially introduced in a slightly different form for the 2019 season. Named Wurzel-Plus Natur, the new soil improver was added to the "Input List for Organic Production in Germany" by the Research Institute of Organic Agriculture (FiBL). Approved for organic farming, this version consisted of the tried and tested mix of mineral nutrients that was complemented by a growth-promoting soil bacterium from the genus Bacillus.

The new Wurzel-Plus treatment product that is launched for the 2020 season sees the bacterium in the nutrient combination replaced by a new strain of Bacillus which rapidly colonises the roots during the seedling stage. It works by producing indole acetic acid to trigger the release of the plant hormone auxin which promotes root growth in the early stage. Furthermore, excretions from the Bacillus dissolve forms of phosphate unavailable to the plant which are then taken up by the bacteria. This phosphate is made available to the oilseed rape plants through the continuous process of bacterial degradation.

RAPOOL is offering this strain of Bacillus in the **Standard** seed treatment formulation for the top segment of newly approved winter rape hybrids in Germany. This product combines the Bacillus strain with the EU-approved product Scenic™ Gold which contains the fungicidal active ingredients Fluoxastrobin and Fluopicolide for controlling early diseases and early infestation of phoma and downy mildew. The **Premium** version additionally includes the product Lumiposa® which contains the insecticidal active ingredient cyantraniliprole for controlling cabbage root fly and turnip sawfly larvae.

The benefits of biostimulants

The bacteria genus Bacillus is known throughout the world for its beneficial ef-



The thermal gradient table shows how the plants (here: LUDGER) develop at different temperatures.

» THE INTERACTION OF ROOT EXCRETIONS OF THE RAPESEED PLANT AND BACTERIA PROMOTES ROOT AND PLANT GROWTH. «

Dr. Ulf Feuerstein

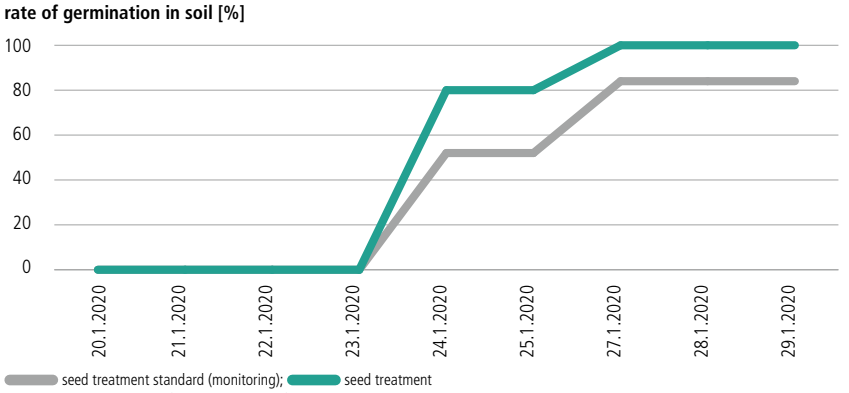
fect on plants. This effect varies depending on the strain and dose, but it seems likely that some Bacilli may be approved as both crop protection agents and fertilisers. Bacilli (lat. "rods") are robust spore-forming bacteria. The fact that they produce dormant endospores as a survival strategy makes them ideal for inclusion in seed treatments. These naturally occurring soil organisms start their reproductive cycle when the coated seed germinates. They rapidly colonise young roots and reproduce synchronously as root growth progresses. This leads to the formation of a biofilm of microorganisms on the surface of the root. Root exudates from the oilseed rape plants on the one hand and excretions and decomposition products from the bacteria on the other combine to have a synergistic effect on nutrient uptake and rhizosphere colonisation. This interaction promotes root and plant growth, making plants more vigorous and resistant to climatic stress factors.

The bacterial strain used in Wurzel-Plus has been selected as a soil improver. Unlike most other strains of Bacillus, it has high rates of reproduction even at low temperatures. It begins to reproduce when soil temperatures reach just 8 °C, enabling it to support seedling growth even under cooler growing conditions. These conditions occurred in autumn 2019 in Germany and other European countries following a prolonged period of drought which delayed the sowing window.

RAPOOL uses a method devised in-house based on a thermogradient table to investigate the effect of temperature on the interaction between plants and bacterial strains. On this table, new oilseed rape hybrids with different seed treatments growing in field soil are continuously tested at soil temperatures ranging from 5 °C to 40 °C. The winter rape hybrid LUDGER coated with the new Wurzel-Plus seed treatment showed an average growth gain of 11 % in germination speed at a soil temperature of 10 °C compared with the control (fungicidal treatment without the Bacillus strain). This difference was most pronounced after 7–8 days when 28 % more cotyledons were fully expanded (Figure 1).

Biostimulants complement chemical products and can be combined to produce effective seed treatment products. The term biostimulant refers not just to microorganisms, but to a range of other product groups (e.g. humic acids or algae extracts) which are also being investigated by the RAPOOL Seed Technology working group. It all comes down to finding the right combination of products which stabilise the yields of current oilseed rape hybrids at high levels in compliance with the legal framework. —

FIGURE 1: RATE OF GERMINATION, MEASURED BY FULLY EXPANDED COTYLEDONS



sown on 17.01.2020 in soil (sandy loam, pH 5.4) at 10 °C soil temperature in the thermogradient table

Source: RAPOOL STWG 2020

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