Rooting power effect of winter wheat under pressure of *Rhizoctonia* - field and lab investigations

European Root Health Forum 2015

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Introduction

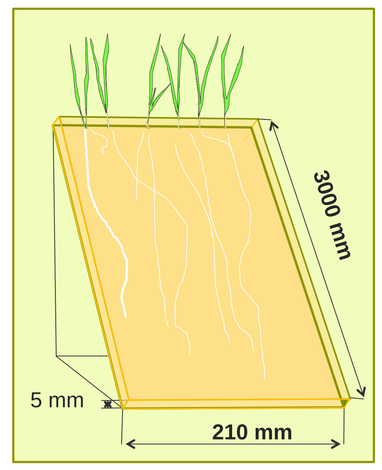
Rhizoctonia spp. is known as an important pathogen of many field crops, including all cereals. It may cause pre and post emergence damping off and shoot death in seedlings. The characteristic symptoms frequently observed as lesions on stem bases of plants, called Sharp Eyespot, are caused by *Rhizoctonia cerealis* but sometimes it may be accompanied by another soil-borne fungus, *Rhizoctonia solani.* Though, *R. solani* affects mainly the root systems of cereals. In this case disease symptoms are diverse and depend on infection severity as well as on anastomosis group of this pathogen. At present Sharp Eyespot disease, especially in winter wheat, plays the most important role in Poland. Nevertheless, the root rot and/or the seedling blight caused by *Rhizoctonia spp*. in general cannot be underestimated.
The primary goal of the research was to assess the impact of both species on winter wheat root system at the early stages of winter wheat development.

Material and Methods

Two stages of the research were carried out. The first one (Exp.1.), under lab conditions, was conducted at INHORT Skierniewice (PL). Inoculum of *Rhizoctonia solani* (isolate Ww11) was mixed with a natural field soil at the dose rate 1 ml / l of soil. Then winter wheat seeds were sown in rhizotrons as three variants:

- *Check*: non-inoculated soil and non-treated seeds,
- *Check inoculated*: soil inoculated and non-treated seeds,
- *VIBRANCE® based offer inoculated*: soil inoculated and seeds treated with a new fungicide formulation based on *sedaxan* (SDHI a.i.).

Rhizotrons with developing winter wheat plants were kept in glasshouse, at temperature10-15^{0}C. Afterwards fresh weight of roots was determined using an electronic balance whereas root length measurements were carried out using root scanner and the WinRhizo software (Regent Instruments, Canada).



The field stage of the research (Exp.2.) was founded on the small-plot field trial with winter wheat, cv. Toras, established in autumn 2014 in area of Poznań (Western Poland). In this case inoculum of *Rhizoctonia cerealis* (Ww542), as sterile (not germinated) infected seeds of wheat, was applied at the dose rate 20 g/m^2. To this purpose, the inoculum was mixed and sown together with healthy seeds treated with seedcare fungicides. Plant sampling from experimental plots was carried out at BBCH 22. At that time plants were randomly selected, dig out and shipped to INHORT for the supplementary measuring with the use of the same equipment.

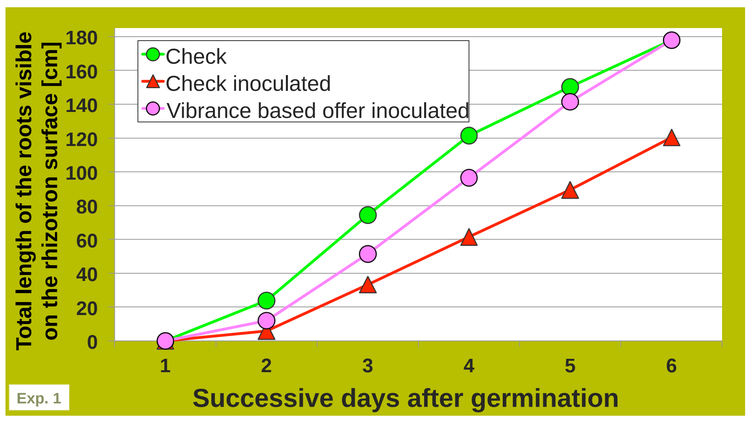


Fig. 1. The growth rate of roots visible on rhizotron

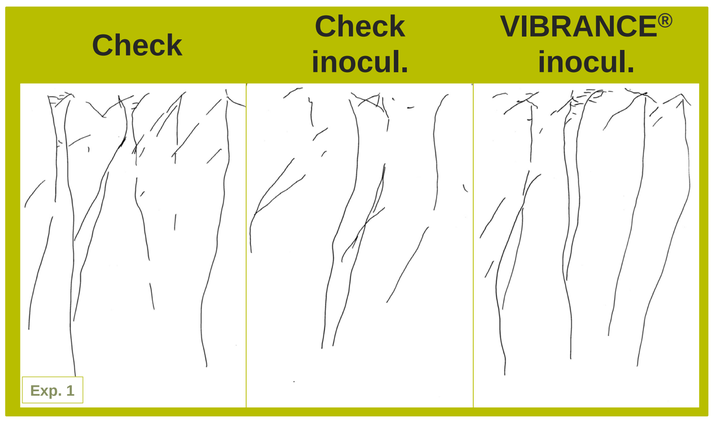


Fig. 2. The roots visible on rhizotron after 7 days

Parameter	Check	Check inoculated	VIBRANCE® inoculated
%	100	67	**100**
g	0.44	0.1	**0.44**
g/plant	0.07	0.03	**0.07**
cm	465	257	**489**
cm/plant	77	64	**81**
Ø mm	0.40	0.26	**0.40**

Exp. 1

Tab. 1. Weight and length of the roots after 7 days

Results

The results of investigation carried out under lab conditions showed a visible deceleration of roots development under pressure of *R. solani*. Measurements performed through 6 - 7 days after plant emergence displayed much shorter length of roots germinated from untreated seeds and developed in inoculated soil (Fig. 1 - 2). The same phenomenon was found at the final assessment. Negative impact of pathogen on such parameters as a percent of emerged plants, their mass and height and root length and diameters, was easily noticeable. The same parameters of plants and their roots, developed from seeds treated with VIBRANCE® based offer, were evidently enhanced (Fig. 3).
Measuring of plants delivered from the field trial did not show an evident impact of *Rhizoctonia cerealis* on their development and no significant differences between parameters of plants collected from inoculated and non-inoculated plots were found (data not presented). It might resulted from too high pathogen pressure and death of seedlings at their early growth stages. Nevertheless some differences for these parameters were ascertained between plots treated with different seedcare products. The weight of roots and above-ground plant parts as well as length of roots were relatively higher after application of VIBRANCE® GOLD or another VIBRANCE® based offer, compared to check or standard product (Fig. 3 and 4).
It may be fairly concluded that measuring of both field- and rhizotron-grown winter wheat plants, clearly indicates RootingPower_effect of *sedaxan* seedcare products. In one case it has resulted from a direct protection of roots under a high pressure of *Rhizoctonia solani.* In another case a bio-stimulating effect of this compound has been the most likely.

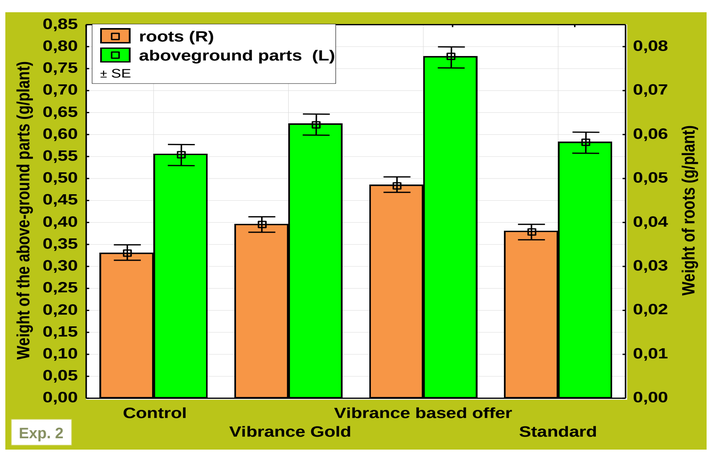


Fig. 3. Weight of the roots and above-ground parts of wheat

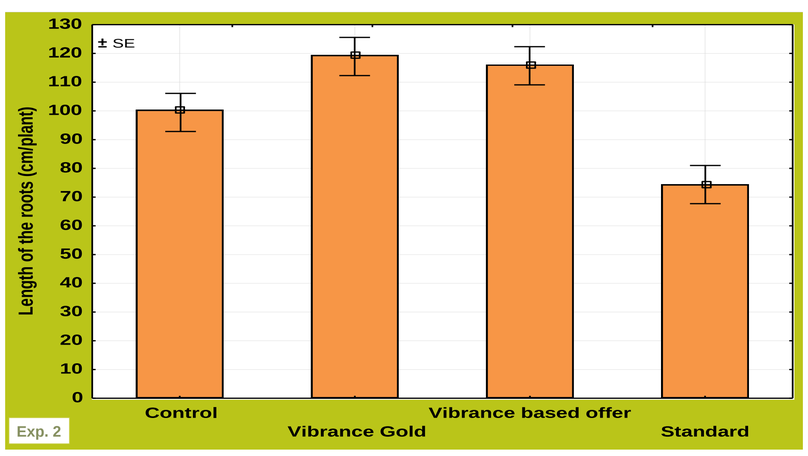


Fig. 4. Length of roots

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