Novochizol
First-in-class polysaccharide nanotechnology

Novochizol SA
Route de l'Ile-au-Bois 1a
1870 Monthey VS
Switzerland

Tel. +41-76-370-73-25
e-mail : info@novochizol.ch
web: www.novochizol.ch

EFFECTS OF NOVOCHIZOL-BASED FUNGICIDE FORMULATIONS ON THE PHYTOSANITARY STATE OF SEEDS, AND ON THE GROWTH AND DEVELOPMENT OF SEEDLINGS OF SPRING WHEAT

AD INTERIM SUMMARY REPORT (June 7, 2021)*

Two experiments testing the effects of Novochizol-based fungicide formulations were carried under laboratory conditions, using Spring wheat, variety Novosibirsk 31 (36.7 g/1000 seeds). Each experiment comprised 6 groups :

1. Control (No treatment of seeds)
2. Treatment with a leading commercial fungicide (active ingredients: Difenoconazole 92 g/l, Mefenoxam 23 g/l) at the recommended dilution (0.5l/ton) (High DM CF)
3. Treatment with a leading commercial fungicide (active ingredients: Difenoconazole 92 g/l, Mefenoxam 23 g/l) at a 13.37-fold lower concentration than the recommended dilution (0.037l/ton). (Low DM CF)
4. Treatment with Novochizol fungicide formulation (Novochizol 2.5%, Succinic acid 1.25%, **Difenoconazole 6.88 g/l, Mefenoxam 1.71 g/l**) at Dividend Extreme's recommended dilution (0.5l/ton). (Low DM N)
5. Treatment with Novochizol fungicide formulation (Novochizol 2.5%, Succinic acid 1.25%, **Difenoconazole 6.88 g/l, Mefenoxam 1.71 g/l**) at a 13.37-fold higher concentration that the a leading commercial fungicide's recommended dilution (6.68 l/ton) (High DM N)
6. Treatment with Novochizol Copper formulation (Novochizol 1%, Cu^{+2} 7 mg/ml), 0.5l/ton. (Copper N)

Seeds were treated under humidification (10 l/t) in closed plastic containers.

* These experiments (and currently ongoing field tests) are being conducted in the laboratory of Plant Protection of the Siberian Federal Agrobiotechnology Research Center of the Russian Academy of Sciences, headed by Natalia G. Vlasenko, Russian leading scientist in plant protection and green biotechnology (published over 400 scientific papers, including 20 monographs. Author of 8 patents.) https://www.sbras.ru/en/organization/36799

Experiment 1

Objective: to assess the phytosanitary state of the treated seeds, as shown by the degree of infection, growth and development of sprouted seedlings.

Seeds were treated 5 days prior to laying on a humid substrate (rolls of filter paper). Germination/growth was carried out for a total of 14 days under controlled humidity (7 days at t = +26°C (thermostat-controlled); 7 days under natural light, t = 22°C). At the end of the experiment, the following parameters were determined: degree of infection, the number of normally developed seedlings, the number of seedlings with lesions in the root system, the height of the seedlings, number of roots per seedling, the length of the tap root, and the biomass of the seedlings.

The **Novochizol formulation** exhibited a strong phytosanitary activity against *Bipolaris sorokiniana* Shoem root rot (degree of infection in the control: 15%).

Biological efficacy	2. High DM CF	3. Low DM CF	4.Low DM N	5. High DM N	6. Copper N
Bipolaris sorokiniana Shoem. root rot	93.3%	46.7%	86.6%	40%	73.3%

Novochizol formulations had no effect on alternariosis infections, unlike the commercial fungicides (biological efficacy of 59.1% and 36.4 % for high DM CF and low DM CF treatments, respectively). The degree of infection reached 20% (Low DM N) and 23% (High DM N).
The Phyto-expertise data, taken altogether, yielded the following results:

Proportions	1.control	2.High DM CF	3.Low DM CF	4. Low DM N	5.High DM N	6. Copper N
Healthy seeds	34%	88%	77.1%	72%	68%	31%
Healthy roots	33.9%	76%	50.3%	25.6%	58.6%	40.5%
Healthy radicles	68.7%	93%	81.3%	84.6%	82.4%	81.3%

Dry biomass (mg)	1.control	2.High DM CF	3.Low DM CF	4. Low DM N	5.High DM N	6. Copper N
Shoot	11.1	14.8	13.12	14.49	15.56	13.28
Roots	10.5	11.09	11.29	10.97	11.25	10.76

Experiment 2

Objective: to assess the growth-promoting effects of Novochizol formulations at the initial stages of organogenesis of wheat

Three days after treatment, seeds were laid on a humid substrate (4 layers of filter paper) in Petri dishes (n=100) and put in a germination chamber, under conditions of controlled humidity and under natural light, t = +20 ... 22 ° C. Germination energy was measured after 1 and 3 days; and germination capacity after 7 days. Growth indicators at the initial stages of organogenesis were recorded after 3 days (length of roots of each seedling, total length of seedlings) and after 7 days (number of roots per seedling, length of seedlings, total mass of roots and shoot per seedling, and mass of each root).

Dry biomass (mg)	1.control	2.High DM CF	3.Low DM CF	4. Low DM N	5.High DM N	6. Copper N
After 1 day						
Radicle emergence	16.33%	15.3%	54.6%	25.8%	13.3%	12.4%
After 3 days						
Germination energy	83.67%	86.7%	88.7%	87.6%	83.6%	90.7%
Roots/seedling	3.22	+ 7.1%	+ 23.3%	+10.8%	+ 2.1%	+ 6.8%
Total root length	10.93 cm	-21.2%	+20.9%	+ 21.4%	-3.6%	+3.5%
Shoot length	2.57 cm	+ 6.2%	+ 35.4%	+ 16.7%	+ 7%	+ 14.8%
After 7 days						
Germination capacity	84.7%	89.8%	92.8%	90.7	87.7%	92.8
Roots/seedling	4.61	4.72	4.8	4.78	4.76	4.67
Shoot length*	12.73	+2.1%	+8%	12.81	13.09	12.81

* The growth of the aerial parts of 3-day old seedlings was highly dependent on the number of roots present (($r = 0.93$; $R^2 = 0.86$) and to a lesser extent on their total length ($r = 0.76$; $R^2 = 0.58$)

Ad interim conclusion

The use of Novochizol allows to substantially decrease the amounts of difenoconazole and mefenoxam, without affecting efficacy as compared to a commercial preparation.