

Search for soil amendments affecting potato cyst nematode: possibilities for parasite control

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Potato cyst nematode (PCN) *Globodera rostochiensis* Woll., is one of the most serious pests of potato, quarantine object. Despite quarantine measures, the nematode has tendency to progressing spread through territory of Russian Federation; particularly, in Republic of Karelia PCN distributed during 45 years (the first observation was in 1976, 60° n.l. and now PCN was reached up to 67° n.l.).

The aim of the study was to estimate the state and reproduction of PCN population (pathotype Ro1) under the addition into the infected soil the amendments in the laboratory experiment and field trials.



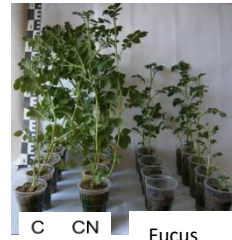
Investigations were carried out in the laboratory experiments and field trials. Potato plants (*Solanum tuberosum* L., cv. Nevsky susceptible to PCN) were grown at photoperiod of 16/8 h (day/night) in sandy soils (500 g per pot, watered daily with the "Knop" nutrient solution (pH 5.5-5.6). PCN dose was 10 cysts per plant of *Solanum tuberosum* L. As amendments were used biochar, shungite, seaweed *Fucus vesiculosus* L. (dry powder and water extract). (Table 1)

Parameter	Variant of experiments					
	Control+ PCN	Biochar B1	Biochar B2	Shungite CSH1	Shungite CSH2	Fucus F
Number of cysts per plant	39±1,76	36±2,31	40±1,40	29±2,30	30±2,81	12±0,84
Number of eggs and jvs inside cysts	127±20	104±20	109±17	122±29	120±19	138±17
Viability of eggs, %	87	77	67	95	86	88

Biochar did not influence on the number of cysts developed on the plant roots. However, an increase in the percentage of dead eggs inside the newly formed cysts was observed (23-33% versus 13% in control). When shungite was added into the soil, the nematode population decreased by 23–25% while the viability of the eggs and larvae inside cysts of the new generation has maintained at the control level (Table 2).

Code	Nematode	Substance	Fraction, mm	Mass, g per pot	Dose, %
Control + PCN	+	-	-	-	-
B1	+	Biochar	2 <	25	5
B2	+	Biochar	3-5	25	5
SH1	+	Shungite	0,5	50	10
SH2	+	Shungite	0,5	25	5
F	+	Fucus	0,5	25	5
C (control)	-	-	-	-	-
CB1	-	Biochar	2 <	25	5
CB2	-	Biochar	3-5	25	5
CSH1	-	Shungite	0,5	50	10
CSH2	-	Shungite	0,5	25	5
CF	-	Fucus	0,5	25	5

Under addition of *F. vesiculosus* crumbs, no nematode development was observed due to unfavorable conditions for plants. It is necessary to fit carefully concentrations of this algae.



The results show the potential of using amendments for controlling PCN populations and these effects are determined by chemical compounds and their influence on soil properties, on the plant growth and development. Biochar and shungite stimulated plant growth, physiological processes and productivity.