INFORMATION REPORT

Effect of BIO-GEL product on changes in soil biological activity in watermelon crops

The main factor that determines the soil life is the microorganisms existing in it which, interacting with the environment in the process of their life, provide gradual changes in soil composition and its beneficial properties. Metabolism of soil microorganisms is accompanied by the release of a certain amount of carbon dioxide which is a kind of soil biological activity indicator.

In the short-term experiment we determined the effect of BIO-GEL foliar application (total spraying) on the biological activity of soil* in watermelon crops. The recommended dose of BiIO-GEL was calculated at a rate of 2 l / ha. In the control crops were sprayed with water. The experiment area was 80 m^2, the area of an elementary plot was 10 m^2, the experiment replication was 4.

The experiment (spraying with water and BIO-GEL according to the experiment variants) started on July, 05, 2018.

The aim of the experiment: to determine the effect of BIO-GEL foliar application on the biological activity of soil in watermelon crops. Soil biological activity was measured in dynamics, every three days (table 1).

It has been established that soil biological activity after BIO-GEL foliar application tended to increase gradually. Thus, in 3 days after BIO-GEL application the intensity of CO_2 production rose to 65.3 mg CO_2/m^2 x hour, or by 17% compared to the control (table 1).

Table 1. Dynamics of soil biological activity in watermelon crops after BIO-GEL foliar application, mg CO_2/m^2 x hour

Variant	Replication	Date of application	Date of soil activity determination				
			09.07	13.07	17.07	21.07	25.07
Control (spraying with water)	I	05.07	54.8	56.2	56.5	58.4	59.9
	II		59.6	58.4	62.1	60.3	58.3
	III		51.2	52.9	54.6	56.2	54.8
	IV		57.7	55.3	56.7	55.5	60.3
	average		***55.8***	***55.7***	***57.4***	***57.6***	***58.3***
Spraying with BIO-GEL (2 l/ha)	I	05.07	64.1	70.1	72.6	74.3	77.8
	II		68.3	74.2	77.8	77.9	82.6
	III		66.4	76.2	78.1	76.8	80.8
	IV		62.6	72.4	77.5	83.4	87.6
	average		***65.3***	***73.2***	***76.5***	***78.1***	***82.2***
HIP_{05} (mg CO_2/m^2 x hour)			**6.88**	**6.47**	**6.00**	**8.43**	**6.63**

In general during the observation period (from 05.07 to 25.07) in the variant with BIO-GEL the intensity of CO_2 production from soil increased by 23.9 mg CO_2/m^2 x hour, or by 41%.

According to our previous research of BIO-GEL in watermelon crops the peak of the soil biological activity was observed at the beginning of August, later soil "breathing" gradually decreased.

Soil biological activity was determined by the field adsorption method of CO_2 release determination according to V.I. Shtatnov. To work with this method vessels-insulators and vessels for absorbing solution were used. Plastic caps 15 cm high and 20 cm diameter were used as insulators, to avoid overheating they were white color. The vessels for CO_2 absorbing solution were Petri dishes. The vessel for absorbing solution was set on soil using special supports, 0.25 mm of 0.1 N alkaline solution (KOH or NaOH) was poured into it, then the vessel was covered with insulator so that the insulator edges were pressed into soil to 1.5-2.0 cm depth or stuffed outside with a small amount of soil.

At the same time a vessel with alkali and an insulator were put into a flat-bottom dish filled with a strong solution of table salt for the control. After 4-5 hours the insulators were removed, 1 ml of 20% solution of barium chloride (for binding absorbed CO_2) was poured into solution, the solution was stirred, poured into flasks and titrated to phenolphthalein with 0.1 N HCl solution until pink color disappeared. Titration was carried out directly in Petri dishes. Similarly the content of CO_2 was determined in the control vessels. The amount of CO_2 released was determined by the formula:

$$Ba = \frac{(a-b)}{S \cdot t}$$, where

Ba – the amount of CO_2 released, mg CO_2/m^2 x hour; *a* – amount of 0.1 N HCl solution for titrating alkali for the control, ml; *b* – the same in the experiment, ml; *K* – coefficient for converting ml of 0.1 N alkali into mg of CO_2 (K=2.2); *S* – insulator vessel area, m^2; *t* – duration of experiment, hour.

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