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## STUDYING THE LONG-TERM EFFECTS OF NOVIHUM ON THE PHOTOSYNTHESIS PERFORMANCE OF VINE PLANTS WITH THE DEVICE SYSTEM FLORATEST

*Изучение флуоресценции хлорофилла (CFD) и динамики коэффициента хлорофилла Digital-Photo-Chrom-Analyse (DPCA) в течение четырех лет доказало пролонгированное действие препарата Novihum на виноградниках. Результаты измерений коррелируются с ускоренным ростом побегов, с более высокой жизнеспособностью растений, с повышенной активностью процесса фотосинтеза, с более высокими показателями урожая. Влияние препарата в течении 4-х лет на активность процесса фотосинтеза на растения винограда линейно падает и заканчивается по прогнозам для сорта Cabernet через 5 лет и для сорта Solaris – через 9 лет. Есть данные, что длительность влияния препарата зависит в большей степени от фитосанитарного состояния почвы, а не от сорта винограда.*

*The long-term effect of the soil adjuvant Novihum on wine plantation was detected over a period of four years by measurements of chlorophyll fluorescence dynamics (CFD) and by Digital-Photo-Chrome-Analysis (DPCA) of the vine leaves. They correlate with faster plant growth, better vitalities, greater photosynthetic efficiency and higher yields for comparable qualities. The effectiveness of Novihum in terms of photosynthetic performance in wine is linear over a 4-year period and ends after 5 years for the Cabernet variety and 9 years for the Solaris variety. There is evidence that less the variety and more the phytosanitary state of the soil affect the long-term effect.*

*Ключевые слова:* Novihum; вино; почва; фотосинтез; фитопатогенные бактерии и грибы.

*Keywords:* Novihum; wine; soil; photosynthesis; phytopathogenic bacteria and fungi.

### Introduction

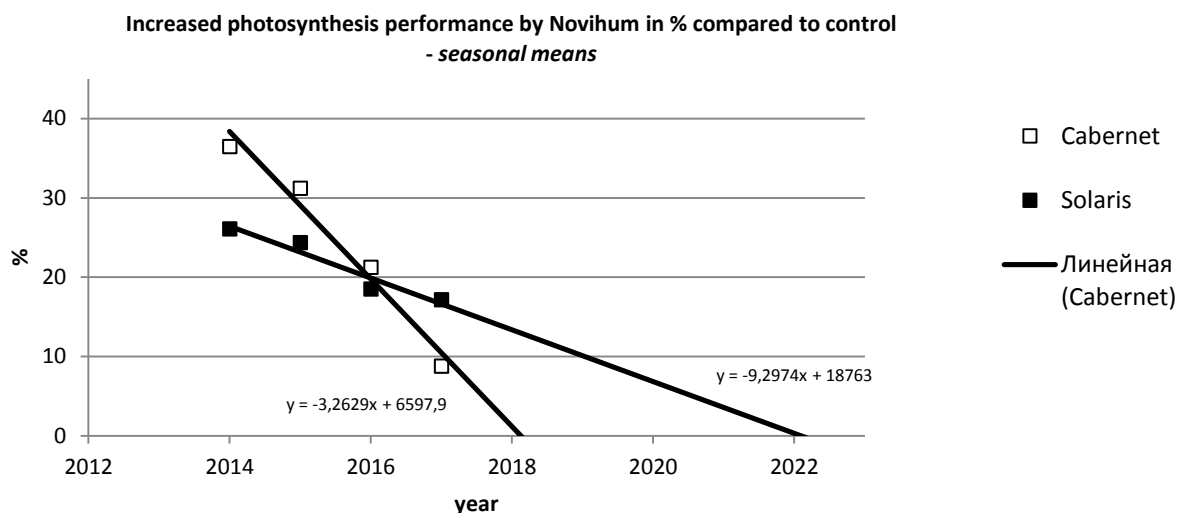
Novihum is an organo-mineral nitrogen fertilizer and is available as a dry granulate. The purpose of the application is the stable provision of soil with substrates with high-quality, nitrogen-containing stable humus. The process of transformation of nutrients into plant-accessible forms is accelerated, fertilizer efficiency and plant resistance to stressful situations increase, soil properties are improved to retain and transmit nutrients to the plant. Novihum is produced from brown coal by means of a chemical process of oxidative ammonolysis and contains about 82 % humic substances (humates, humic acids, fulvic acids) and from 5.5 to 6.0 % nitrogen, 33 % of which is in a form accessible to the plant. The content of N<sub>min</sub> is up to 4.2 g / kg of CB (dry matter). For prolonged action, humic substances are responsible. Novihum serves as a source of constant replenishment of soil, depleted or not containing humus, with stable nitrogenous humus. Novihum prevents the elution of nutrients. Norms of application: from 0,5 to 2,0 kg / m<sup>2</sup>[1].

### Methodology

The CFD photosynthetic performance was determined three times at intervals of 4 weeks each year (2014-2017) by a method developed by Nowick [2]. The seasonal averages were evaluated. The determination and evaluation of the phytosanitary status of the test areas was carried out according to a method described by Zheldakova and Myamin[3]. With the help of 5 test methods, all bacteria and fungi isolated from the soil samples were examined and classified for phytopathogenic behavior. Here the results of four soil samples each were averaged.

## Results and discussion

The mean photosynthesis performance of the Solaris variety is 20 to 30 % higher in all vintages (2014-2017) than in the Cabernet variety. For both varieties, Novihum-treated plants show a higher photosynthetic performance, 1 year after planting by 35 % (Cabernet) and 25 % (Solaris). These differences are reduced after 4 years to 10 % (Cabernet) and 15 % (Solaris). It seems that the effectiveness of Novihum ends after 5 years (Cabernet) or 9 years (Solaris) depending on the variety:



Increased photosynthesis performance by Novihum in % compared to control

But apparently found different lengths effectiveness of Novihum may not be relevant as the wine plantation was created with soil of a recultivated lignite mine and the soil is inhomogeneous assembled as show the results of soil analysis (2015 Autumn):

The results of soil analysis in Autumn 2015

Variety	Titer / absolut bacteria and fungi Mio. CFU/g	pathogen Mio. CFU/g	pathogen %
Cabernet (Novihum)	513	65	13
Cabernet (Control)	1389	986	71
Solaris (Novihum)	48	3	7
Solaris (Control)	132	77	59

The greater absolute and relative concentration of phytopathogens in the Cabernet variants may lead to a faster absolute and relative decrease in photosynthesis performance compared to the Solaris variants.

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