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Review letter dedicated to BIOPLANT FLORA humic acid based fertilizer with microelements (BIOPLANT FLORA)

Mechanism of action

It is well known that cell membrane is unable to absorb nutrients in form of large, in microworld's view, molecular complexes. That is why processing of BIOPLANT FLORA humic acids based fertilizers with microelements (hereinafter – Bioplant Flora) includes nanotechnology-refining of large molecular complexes of nutrients and biologically active substances. Obtained substances with typical molecular sizes become much more active; therefore rate of application of our preparation amounts only one to three litres per hectare. Besides microbiological technologies using symbiotic associations of soil microorganisms (digestion of organic substrate into raw material) and having positive effect on plants are applied.

Bioplant Flora shows stimulating influence on plants due to microorganisms synthesizing enzymes and other physiologically active substances.

Treatment of seed material by spraying/soaking increased adaptive capacity of plants due to primary, initial stimulation of genetic potential of seeds resulting in their increased germinating power and field emergence, as well as in survival and productivity of plants. Bioplant Flora improves coming-up rate of weak seed material increasing viability of sprouts due to twofold - threefold reduction of their killing by different root infections.

Easily accessible forms of humous compounds stimulates plants growth and strengthen their immune system, as well as improves absorption of nutrients, activates exchange processes within 'soil-plant" system and, thus, takes positive effect on plants tolerance to thermal impacts (frosts and drought).

Fertilizer contains complex of microelements, which increases oxidase activity (oxygen exchange) and, therefore, stimulates processes of

respiration, photosynthesis and considerably extends ratio of winter plants virtually in all climatic areas.

Application of Bioplant Flora provide plants with optimal nutrition, activates their enzymatic activity at cellular level, normalizes and intensifies exchange processes. This leads to strengthening of plants' immune system and their general sanitation visually manifested in increased number of leaves, leaf area, appearance of dark green colouration, raised ratio of fruiting shoots and stimulation of abundant flowering.

In decorative gardening, increase of flowers in number and size is observed. Inflorescences obtain brighter and deeper colouration. Areas on lawn with weakened herbage are cured, grass becomes more elastic and tolerant to against trampling, obtains uniform green colour. Application of preparation results in shortening of root formation As a result of preparation application rooting terms after replant are shortened and productivity increases.

Application of Bioplant Flora allows to increase immunity and decrease incidence of their diseases. This is first of all due to vital activity of beneficent soil microflora, which forces on all phytopathogenic microflora from its habitat.

During spraying with aqueous solution of Bioplant Flora, nutritive and biologically active substances are applied directly to the lamina, activating synthesis and drainage of nutritive and biologically active substances from leaf to fruits and root zone. It increases biological activity in rhizosphere, accelerates processes of decomposition and smoothes impact of chemical stress in soil-plant system.

Application of Bioplant Flora fertilizer guarantees increased productivity, variety and quality, reduces maturing terms of most agricultural crops and improves condition of soil. Obtained agricultural products are ecologically safe. Besides, application of BF promotes increase of weight, bearding and length of root system, which makes plants quire tolerable to drought and cold. The preparation is compatible with all herbicides and pesticides and requires no modifications of corresponding agricultural devices.

Here are results of tests successfully performed during several years:

N	Agricultural crop	Productivity before application	Productivity upon application	Productivity growth, %	Other qualitative changes	Test site and entity
1	BUG oat	14 dt/ha	18 dt/ha	29%	Development of strong root system , lamina growth, increase of grain content and weight, no root rot or slower vegetation after treatment with herbicides	Ruchyevskoye LLC, Kanakovskiy District, Tver Region A. V. Kozhinov 8(48242)63321
2	ARGAMAK oat	19 dt/ha	28 dt/ha	47%	Development of strong root system , lamina growth, increase of grain content and weight, no root rot or slower vegetation after treatment with herbicides	Ruchyevskoye LLC, Kanakovskiy District, Tver Region A. V. Kozhinov 8(48242)63321
3	IMENI RAPPOPORTA winter wheat	14 dt/ha	20 dt/ha	43%	Development of strong root system , lamina growth, increase of grain content and weight, no root rot or slower vegetation after treatment with herbicides	Ruchyevskoye LLC, Kanakovskiy District, Tver Region A. V. Kozhinov 8(48242)63321

4	IRGINA summer wheat	16 dt/ha	22.6 dt/ha	41.2%	Development of strong root system , lamina growth, increase of grain content and weight, no root rot, intensification of potassium nutrition	Ruchyevskoye LLC, Kanakovskiy District, Tver Region A. V. Kozhinov 8(48242)63321
5	Winter wheat, 2006-2007	36 dt/ha	45.1 dt/ha	25.5%	Increase of germinating power, no root rot or Fusarium, formation of strong root system, increase of grain content and weight, lamina growth, intensification of photosynthesis	Eysk State Crop Test Site, Krasnodar Territory Mironenko 8-86132-99274
6	REGASOL hybrid sunflower	21 dt/ha	25.5 dt/ha	21.4%	Lamina growth, intensification of photosynthesis, reduction of pesticides application, 48 % reduction of NPK.	Doroshenko Peasant Farm Holding, Krasnodar Territory Doroshenko 8 (86151) 59758
7	OPERA hybrid sunflower	24 dt/ha	30.2 dt/ha	25.8%	Lamina growth, intensification of photosynthesis, reduction of pesticides application, 48 % reduction of NPK	Doroshenko Peasant Farm Holding, Krasnodar Territory Doroshenko 8 (86151) 59758»
8	Sunflower, 2005-2008	18.2 – 20.3 dt/ha	22.5- 25.7 dt/ha	23.6 – 26.6%	Lamina growth, intensification of photosynthesis, 30-50 % reduction of pesticides application, 35-55 % reduction of NPK, maximum productivity up to 34dt/ha	Doroshenko Peasant Farm Holding, Krasnodar Territory Doroshenko 8 (86151) 59758»
9	Winter wheat, 2006-2007	34.7 dt/ha	40.7 dt/ha	17.3%	Stable productivity, 30-50 % reduction of pesticides application, 35-55 % reduction of NPK, 3-4 quality grade wheat	Doroshenko Peasant Farm Holding, Krasnodar Territory Doroshenko 8 (86151) 59758
10	DAR ZAVOLZHYA tomato, open-ground	450 dt/ha	563 dt/ha	25%	Improved seed sprouting, increase of root weight and bearding , increased number of flowers and fruits, healthy yield	Eysk State Crop Test Site, Krasnodar Territory Mironenko 8-86132-99274
11	NOVICHOK tomato, open-ground	336 dt/ha	487 dt/ha	45%	Improved seed sprouting, increase of root weight and bearding , increased number of flowers and fruits, healthy yield	Eysk State Crop Test Site, Krasnodar Territory
12	FESTIVALNAYA strawberry, open-ground	314 dt/ha	466 dt/ha	48.4%	Lamina growth, intensification of photosynthesis, increased number of fruit stems and berries on them, no root rot	Eysk State Crop Test Site, Krasnodar Territory Mironenko 8-86132-99274
13	SAMSON carrot	270 dt/ha	334 dt/ha	23.8%	Lamina growth, increased number of leaves, intensification of photosynthesis	Agrokompleks Rassvet CJSC, Moscow Region
14	Sugar beet	280 dt/ha	560 dt/ha	100%	Lamina growth, increased number of leaves	Borispol Sugar Plant, Borispol, Ukraine
15	MITRIDAT tomato, protected ground, autumn 2008			Expected growth 60%	Acceleration of vegetation, increase of root weight and lamina growth, bright green colour of leaves, plants look stronger than in reference group	Alekseyevskoye Sovkhoz, Ufa, Bashkiria 8(347)2709350
16	KURAZH cucumbers, protected ground, autumn 2008			Expected growth 50%	Acceleration of vegetation, increase of root weight and lamina growth, bright green colour of leaves, plants look stronger than in reference group	Alekseyevskoye Sovkhoz, Ufa, Bashkiria 8(347)2709350
17	Decorative flowers, protected ground			Expected growth of lamina 90%	Acceleration of vegetation, increase of root weight and lamina growth, bright green colour of leaves, plants look stronger than in reference group, increased number of inflorescences, larger deeper coloured flowers, faster marketable appearance	Greenhouses of Flower Production and Greening Section, AREC, Moscow V.M. Eremina 8(905)7644821
18	Citrus, stone fruits, grape, apples, kiwi, strawberry, pear, blackberry, roses, cranesbill all open-ground			Expected growth of lamina 25%	Positive impact on plants, lamina growth, bright green colour of leaves, plants look stronger than in reference group, improved habit of plants	Agriculture Research Institute, Abkhazian Academy of Sciences, Abkhazia
19	KURAZH F1 cucumbers, open-ground, autumn 2008			Expected growth 55%	Elimination of phytotoxic impact of chemical fungicides on plant, 25-30% intensification of plants growth and development, 30% increase of fruits in nodes, 25-30% lamina growth,	Agriculture Research Institute, Abkhazian Academy of Sciences, Abkhazia

					improved habit of plants	L. Ya. Ayba 8-10-(99544) 264460
20	Winter wheat, autumn 2008			Expected growth 30-35%	20.5% increase of root length, 34.5% increase of number of leafs, 19.3% increase in tillering nodes	Vozrozhdenie-1 Experimental Farm Holding, Samara Region Sheshunova 8-9023209182

Bioplant Flora fertilizer is developed and manufactured by PLANT LLC.

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