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Expert report

of the environmental impact assessment of the agrichemical
Humic acids-based fertilizer with microelements
"Bioplant Flora"

Registree: OOO (LLC) "Plant", Russia

2008

The Soil Science Faculty of the M. V. Lomonosov Moscow State University has examined the filed materials of the main sections, necessary for ecological assessment of the agrochemical Humic acids-based fertilizer with microelements “Bioplant Flora” (hereinafter - “Bioplant Flora”). The conditions of trial experiments’ realization correspond to the requirements and standards accepted in our country. The main qualitative and quantitative ecologically relevant characteristics of the agrichemical (general characteristic, physical and chemical properties, environmental behavior, ecotoxicity) are given below.

A. General information of the agrichemical

Table 1

Information type	Contents	Notes
1. Name (trade name of the agrichemical)	Humic acids-based fertilizer with microelements “Bioplant Flora”	
2. Registree (applicant)	OOO (LLC) “Plant”, 142100, Moscow Region, town of Podolsk, Fevralskaya str., H. 59	Tel/fax: (495)920-05-16, 505-68-67
3. Producer/manufacturer	Same as above	
4. Supplier	Same as above	
5. Type of the agrochemical	Humic acids-based fertilizer	
6. Purpose (sphere of application)	Preplanting treatment of plants, autumn treatment of soil, spring spraying, plant-root dressing, foliar dressing, usage in drop irrigation systems, in ornamental gardening, in verdurization of municipal formation units, in agriculture and in private subsidiary agricultural economies.	
7. Expert examination objective	State registration	
8. Crops	Grain spring and winter crops, potatoes and root crops, vegetables and bulbous crops, leaf vegetables, trees and shrubs and other types of agricultural crops.	
9. Method of application	See Regulations of application	
10. Time of application	Autumn, spring, summer	
11. Consumption rate (application dose)	See Table 2	
12. Composition of the agrochemical	Manure-based compost dissolved in water and enriched with microelements	
13. Package	Type: polymeric vials, bottles or canisters Volume: 1,5 mg, 0,25 l, 0,5 l, 1 l, 3 l, 5 l, 10 l and 20 l.	
14. Documents certifying quality and safety	- Protocols of laboratory tests of the products for content of heavy metals and radionuclides; - sanitary-epidemiological report; - expert report of the toxicological-hygienic agent material assessment result.	
15. Registration in other countries	Not carried out	
16. Terms of reference and technical documentation	TU (TOR) 9899-009-75292641-2008	

B. Essential information

B.1 Technology and regulations of application

The agrochemical “Bioplant Flora” is applied as organo-mineral humic fertilizer with microelements for pre-sowing (pre-planting) treatment of seeds, plant-root and foliar dressings of agricultural crops, fruit and berry crops, ornamental flower crops on all soil types.

Table 2

Regulations of agrichemical application

A. For agricultural industry

Crops	Agent material application dose	Time and particulars of application
Grain spring crops (wheat, rye, barley, oats, millet, sorghum etc)	0,5-1 l/t Solution consumption 10 l/t	Pre-sowing treatment of seeds
	1-2 l/t Solution consumption 300 l/t	Foliar dressing on the stage of full sprouts
	2-3 l/ha Solution consumption 300 l/ha	Foliar dressing on the stage of bushing out – beginning of stalk-shooting
Grain winter crops (wheat, rye, barley, oats, millet, sorghum, triticale etc)	0,5-1 l/t Solution consumption 10 l/t	Pre-sowing treatment of seeds
	2-3 l/ha Solution consumption 300 l/ha	Foliar dressing in spring on the stage of bushing out
Potatoes	0,5-1 l/t Solution consumption 20 l/t	Pre-sowing treatment of tubers
	2-3 l/ha Solution consumption 300 l/ha	Foliar dressing on the stage of full sprouts
	1-2 l/ha Solution consumption 300 l/ha	Foliar dressing before first earthing-up
	3-5 l/ha Solution consumption 300 l/ha	Foliar dressing in the beginning of the bud-formation stage
Technical crops and edible root crops	2-3 l/ha Solution consumption 300 l/ha	Foliar dressing on the stage of full sprouts
	3-4 l/ha Solution consumption 300 l/ha	Foliar dressing in 20-30 days after the first dressing
	4-5 l/ha Solution consumption 300 l/ha	Foliar dressing in 60-70 days after the first dressing
Vegetable crops (grown by seedlings)	2 ml/kg Solution consumption 1 l/kg	Wetting of seeds for 3 hours
	7-8 l for 350-400 l of water for 100000 containers	Puddling of containers before pricking-out of seedlings
	4-5 l/ha Solution consumption 300 l/ha	Foliar dressing in 3-5 days after pricking-out
	2-3 l/ha Solution consumption 300 l/ha	Foliar dressing in the beginning of the bud-formation stage and in 15 days
Vegetable crops (grown by direct sowing)	2 ml/kg Solution consumption 1 l/kg	Wetting of seeds for 3 hours
	4-5 l/ha Solution consumption 300 l/ha	Foliar dressing in the period of 3-4 leaves development
	6-7 l/ha Solution consumption 300 l/ha	Foliar dressing on the bud-formation stage
	4-5 l/ha Solution consumption 300 l/ha	Foliar dressing in 15 days after the second dressing
Cabbage	2,5 ml/kg Solution consumption 1 l/kg	Wetting of seeds for 3 hours
	7-8 l for 350-400 l of water for 100000 containers	Puddling of containers before pricking-out of seedlings
	3-4 l/ha Solution consumption 300 l/ha	Foliar dressing after planting of seedlings
	4-5 l/ha Solution consumption 300 l/ha	Foliar dressing on the stage of head-setting

Onion, garlic	2,5 ml/kg Solution consumption 1 l/kg	Wetting of seeds for 3 hours
	2 l/t Solution consumption 20 l/t	Treatment of planting material before planting
	4-5 l/ha Solution consumption 300 l/ha	Foliar dressing on the stage of full sprouts
	3-4 l/ha Solution consumption 300 l/ha	Foliar dressing in 20 days after the first dressing
Leaf vegetable crops	2 ml/kg Solution consumption 1 l/kg	Wetting of seeds for 6 hours
	3-4 l/ha Solution consumption 300 l/ha	Foliar dressing on the stage of full sprouts
	4-5 l/ha Solution consumption 300 l/ha	Foliar dressing in 12-14 days after the first dressing
Strawberries	6-8 l/ha Solution consumption 300 l/ha	Foliar dressing in spring in the beginning of spring vegetation
	8-10 l/ha Solution consumption 300 l/ha	Foliar dressing in the blossoming period
	3-4 l/ha Solution consumption 300 l/ha	Foliar dressing after harvesting
Fruit trees	4-5 l/ha Solution consumption 800-1000 l/ha	Foliar dressing before foliage expansion
	5-6 l/ha Solution consumption 800-1000 l/ha	Foliar dressing in the period of bud-formation – start of blossoming
	5-6 l/ha Solution consumption 800-1000 l/ha	Foliar dressing in 10 days after end of blossoming
Berry-bearing shrubs	5-3 l/ha Solution consumption 800-1000 l/ha	Foliar dressing in the period of foliage expansion
	3-4 l/ha Solution consumption 800-1000 l/ha	Foliar dressing in the period of bud-formation – start of blossoming
	4-5 l/ha Solution consumption 800-1000 l/ha	Foliar dressing in 10 days after end of blossoming
Grapes	4-5 l/ha Solution consumption 800-1000 l/ha	Spring foliar dressing in the period of sap flow
	2-3 l/ha Solution consumption 800-1000 l/ha	Foliar dressing on the stage of scions and inflorescences growing
	3,5-5,5 l/ha Solution consumption 800-1000 l/ha	Foliar dressing on the stage of berries growing
Ornamental trees and shrubs (foliaceous)	0,1 l for 10 l of water	Wetting of nursery transplants' roots for 2-3 hours before planting
	8-10 ml of fertilizer for 20 l of water Solution consumption 2 l/shrub, 10 l/tree 5-10 m high 20 l/tree 10-20 m high	1 st foliar dressing in the period of foliage expansion, the next 2-3 dressings 21-28 days apart from each other
Ornamental trees and shrubs (coniferous)	0,1 l for 10-15 l of water	Plant-root watering while planting (replanting)
	8-10 ml of fertilizer for 20 l of water Solution consumption 2 l/shrub, 10 l/tree 5-10 m high 20 l/tree 10-20 m high	Spring foliar dressing at start of vegetation
	8-10 ml for 10-15 l of water	Plant-root dressings 2-3 times 15-20 days apart from each other
Lawn grass	5-7 l/ha Solution consumption 300-500 l/ha	Spring foliar dressing at start of sward growing
	3-5 l/ha Solution consumption 300 l/ha	Spring foliar dressing 5-6 times after grass mow-down

Flower crops	2 ml/kg Solution consumption 1 l/kg	Wetting of seeds for 3 hours
	5-7 l/ha Solution consumption 300-600 l/ha	Spring foliar dressing at start of vegetation resumption (for perennial plants) or on the stage of full sprouts (for annual plants)
	3-5 l/ha Solution consumption 300-600 l/ha	Foliar dressings 3-6 times 12-15 days apart from each other
Lawn grass	from 3-4 to 7-8 (for weakened plants) l/ha Solution consumption depends on the watering system	Plant-root dressings 2-3 times during the season

A. For private subsidiary agricultural economies:

Crops	Agent material application dose	Time and particulars of application
Vegetable, fruits and berries and ornamental flower crops	100-200 ml for 10 l of water	Wetting of seeds for 6-12 hours, of planting material and roots of fruits and berries and ornamental flower crops seedlings for 2-3 hours.
Vegetable and flower (annual) crops	10-50 ml for 10 l of water plant-root dressing – 3-10 l/m ² ; foliar dressing – 1,5-3 l/10m ²	Dressing after full sprouts appearance or seedlings planting, then 3-4 times 10-15 days apart from each other
Flower crops (perennial)		Dressing 1-2 times before blossoming and 1-2 times after blossoming
Fruit and berry trees and shrubs	10-50 ml for 10 l of water Solution consumption: foliar dressing – shrubs – 1,5-2 l/10m ² of shrub; trees 2-3 l for a young tree, 5-10 l for a mature tree; plant-root dressing – from 10 to 20 l for one shrub depending on the plant size; for trees – from 10 to 30-50 l	Dressing before foliage expansion, in the bud-formation and blossoming start period and in 10 days after end of blossoming
Ornamental trees and shrubs (foliaceous)	10-50 ml for 10 l of water Solution consumption: foliar dressing – shrubs – 1,5-2 l/10m ² of shrub; trees 2-3 l for a young tree, 5-10 l for a mature tree; plant-root dressing – from 10 to 20 l for one shrub depending on the plant size; for trees – from 10 to 30-50 l	Spring dressing during foliage expansion, further 2-3 dressings 21-28 days apart from each other
Ornamental trees and shrubs (coniferous)		Spring dressing at start of vegetation and 2-3 times 15-20 days apart from each other
Lawn grass	10-50 ml for 10 l of water plant-root dressing – 3-5 l/m ² ; foliar dressing – 1,5-3 l/10m ²	Spring dressing at start of sward growing, further 5-6 times after grass mow-down
Ornamental potted flower plants	5 ml for 2 l of water Solution consumption: foliar dressing – until full humidification of leaf surface; plant-root dressing – until humidification of soil ball	Dressing from March till September – 1 time in 10-15 days, from October till February – 1 time in 1-1,5 months.

B.2 Qualitative and quantitative composition of the agrichemical

The agrichemical "Bioplant Flora" is a dark-brown liquid suspension. The fertilizer is prepared by disintegration of humic substances' molecules in micro-vortical hydrodynamic fields.

Table 3

Main agricultural chemical characteristics of the agrichemical

Name of the determinant	Actual content in the agrichemical	Protocols of tests (№, date, organization)
General nitrogen	189 mg/ml	Protocol of tests № 35y issued 09.10.2008 by the Independent Institute of Expert Examination and Certification, Moscow City, Yaroslavskaya Str., H. 8 Bld. 3, Off. 402, ROSS RU.001 510353)
General phosphorus	31 mg/ml	
General potassium	310 mg/ml	
General carbon	1,2 g/l	
Humic acids	2,1 g/l	
Fulvic acids	0,28 g/l	
Copper	0,14 mg/l	
Zinc	135,2 mg/l	
Cobalt	15,9 mg/l	
Manganese	170,4 mg/l	
Magnesium	63,6 mg/l	
Molybdenum	748,5 mg/l	
Iron	11,2 mg/l	
Boron	4,4 mg/l	

Table 4

Content of toxic chemical substances

Name of the determinant	Actual content in the agrichemical, mg/l	Protocols of tests (№, date, organization)
Lead	0,01	Protocol of tests № 35y issued 09.10.2008 by the Independent Institute of Expert Examination and Certification, Moscow City, Yaroslavskaya Str., H. 8 Bld. 3, Off. 402, ROSS RU.001 510353)
Cadmium	0,002	
Arsenic	0,002	
Mercury	0,003	
Nickel	0,53	
<i>Content of organic pesticides</i>		
Heptachlor	<0.001	Protocol of tests № 35y issued 09.10.2008 by the Independent Institute of Expert Examination and Certification, Moscow City, Yaroslavskaya Str., H. 8 Bld. 3, Off. 402, ROSS RU.001 510353)
HCCH (hexachlorocyclohexane) isomers	<0.001	
DDT (dichlorodiphenyltrichloroethane) and its metabolites	<0.002	
Value of natural radionuclides' effective activity	52 Bq/l	
Ra-226	10 Bq/l	
Th-232	11 Bq/l	
K-40	220 Bq/l	
Value of technogenic radionuclides' activity in Bq/l		
Cesium-137	3	Protocol of tests № 35y issued 09.10.2008
Strontium-137	5	

Content of dangerous biological agents	
Biological contaminant	Note
Pathogenic microflora (including salmonellae) Conditionally pathogenic microflora: - helminth eggs and viable larvae dangerous for man - cysts of intestinal pathogenic protozoa - maggots and chrysalides of synanthropic flies	For this type of agrichemical such examination is not required

B.4 Content of nitrate nitrogen in agricultural production. If the recommended regulations of application are complied with, the accumulation of nitrate nitrogen in crop products is virtually excluded.

B.5 Method of neutralization. Not necessary.

C. Toxicological description of the agrochemical

According to its level of effects the agrichemical pertains to low-hazardous substances – hazard category 4, its composition does not contain toxic components with content exceeding regulatory admissible values.

D. Sanitary description

1. Information on the agrichemical behavior in environmental mediums

In the process of fertilizer transformation no environmentally hazardous or toxic substances are generated. The application of the fertilizer would not result in negative impact on the environmental mediums and the fertilizer does not contain environmentally hazardous admixtures in concentrations exceeding regulatory admissible levels.

2. Effect on the quality and nutritive value of food products

The fertilizer would not exert negative effect on the quality and nutrient value of crop products. There were no extra dedicated tests carried out, but on the basis of the agrichemical composition and suggested application regulations the crop products would comply with the requirements of SanPiN (Sanitary Regulations and Standards) 2.3.2.1078-01.

3. Guidelines for safe storage, transportation and application

The fertilizer is prepacked in polymeric containers – vials, bottles, jars, canisters. The volume of the containers amounts to 1,5 ml, 0,5; 1; 3; 5; 10; 20 liters. Transportation containers – corrugated cardboard boxes acc. to GOST (National Standard) 9421-80, sacks, shrink film wrapping.

The packaged fertilizer shall be stored in closed, dry, ventilated storage buildings excluding ingress of atmospheric precipitation and subterranean waters, on rack-type shelvings in pallets, set on flat solid base. Storage temperature ranges from 0 °C to 40 °C. Guaranteed storage life of the fertilizer amounts to 18 months. Effective application life is unlimited.

The paper, cardboard and wooden containers used for fertilizer transportation is disposed of by combustion in specially allotted areas observing the fire prevention measures, the polymeric containers are disposed of in accordance with special rules (by combustion or discarding together with domestic waste in specially designated locations). The fertilizer is fire- and explosion-safe. The technological and storage premises shall be supplied with fire extinguishants such as sand, fire-extinguisher OIIV-5 and asbestos cloth.

The vehicles used for delivery of ingredients are subject to preventive treatment at least once a month by applying of permissible agents. In the process of production and packaging of the fertilizer the general safety rules acc. to GOST 12.1.004-91 and SanPiN 1.2.1330-03 shall be observed.

4. First aid in case of intoxication, conditions of safe application

Should the agrichemical contact the skin of the worker, the affected area shall be washed with water and soap. In case of contact with eyes, it should be washed out with large amount of pure running water. In case of internal ingress one should drink several glasses of water, cause vomiting, drink some water with activated charcoal (1 g of sorbent per 1 kg of body weight). In case of inhaling, the injured person shall be brought out to fresh air, personal protection equipment shall be taken off, oral cavity rinsed out with water and abundant potation administered. In case of need a doctor should be consulted.

5. Methods of toxic admixtures detection

The detection of toxic admixtures content in the agrichemical shall be carried out in accredited laboratories in conformity with attested or standardized methods specified in Table 6.

**List of authorized methods for detection of toxic admixtures in agrichemicals
in the course of registration test procedures**

Chemical element	Name of the regulatory document	
	Atomic absorption method	Inductively coupled plasma method
arsenic (As)	PND F (Federal Environmental Protection Regulatory Document) 16.1:2.2:3.17-98	CV (Method Code) 5.18, 19.01-96 "A"; FR (Federal Registry No.) 1.31.2000.00133; PND F 16.1:2.3:3.11-98
mercury (Hg)	CV 5.21.02-96 "A"; FR 1.31.2000.00134; M-MVI (Method of Measurement Execution) 01-01	-
cobalt (Co)	FR 1.31.2000.00134	CV 5.18, 19.01-96 "A"; FR 1.31.2000.00133; PND F 16.1:2.3:3.11-98
cadmium (Cd)	PND F 16.1:2.2:2.3.36-2002; RD (Ruling Document) 52.18.191-89	CV 5.18, 19.01-96 "A"; FR 1.31.2000.00133; PND F 16.1:2.3:3.11-98
lead (Pb)	PND F 16.1:2.2:2.3.36-2002; RD 52.18.191-89	CV 5.18, 19.01-96 "A"; FR 1.31.2000.00133; PND F 16.1:2.3:3.11-98
nickel (Ni)	PND F 16.1:2.2:2.3.36-2002; RD 52.18.191-89	CV 5.18, 19.01-96 "A"; FR 1.31.2000.00133; PND F 16.1:2.3:3.11-98

Use of alternative instrumental methods of analysis for detection of arsenic and cobalt is permitted provided that sensitivity of the chosen method is not < 1 mg/kg for arsenic and < 5 mg/kg for cobalt.

- radionuclides are detected in accordance with NRB-99 (Norms of Radioactive Safety), SP (Sanitary Rules) 2.6.1.789-99 (MU – Methodic Guidelines – “Detection of strontium-90 content in soils and plants by radiochemical method”, M., 1995).

E. Ecotoxicological description of the agrochemical

Earthworms and soil microorganisms. The agrichemical Humic acids-based fertilizer with microelements “Bioplant Flora” according to the above-specified information (values of chemical contamination levels) would not exercise a negative impact on the content and condition of earthworms and on the soil microorganisms. Therefore carrying out of extra dedicated tests is not necessary.

Environmental impact assessment of the fertilizer

The agrichemical Humic acids-based fertilizer with microelements “Bioplant Flora” is intended for wetting and dressing of agricultural, ornamental flower and fruit and berry crops.

According to its level of effects on human organism the agrichemical pertains to low-hazardous substances – hazard category 4.

The analysis of the submitted materials executed by us allows to draw the following conclusions:

1. At soil inoculation of the agrichemical the content of toxic admixtures exceeding accepted soil standards is unlikely.

2. In the process of agrichemical destruction no environmentally hazardous and toxic metabolites are generated.

3. The agrichemical does not exercise a negative impact on environmental mediums and does not contain admixtures hazardous for environmental mediums in concentrations exceeding regulatory admissible levels.

SOIL COVER. The inoculation of the agrichemical Humic acids-based fertilizer with microelements “Bioplant Flora” in recommended doses would not result in soil cover contamination with hazardous chemical substances and natural radionuclides.

SURFACE AND SUBTERRANEAN WATERS. The possibility of surface and subterranean waters contamination with the agrichemical components is unlikely.

ATMOSPHERIC AIR. The contamination of atmospheric air with components and admixtures composing the agrichemical is excluded.

SALUTIFEROUS FAUNA AND FLORA. The negative impact of the agrichemical on the salutiferous fauna and flora is unlikely.

5. Nature conservation restrictions.

If the recommended application regulations are complied with, the agrichemical can be used without restrictions.

Conclusion

Taking into consideration the environmental impact level of the agrichemical **Humic acids-based fertilizer with microelements “Bioplant Flora”** and its ecotoxicity, we deem it possible to recommend this agrichemical for state registration in Russia for a period of 10 years.

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