JHG ANALYTICAL SERVICES LIMITED

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ANALYSIS REPORT REFERENCE: 20-12-18878

CHEMICAL

ANALYTICAL REPORT

Nature of Product: Liquid Seaweed Fertilizer.

Date of Report: 28th. December 2020.

Sample Reference: Liquid Seaweed Sample 48% Concentration.

Sample Size: 1 x 1,000mls.

E.Marker A/S
Okslundvej 8
BOV DK-6330
Padborg
Denmark.

For the Attention of: Mr. Carsten Marker.

Contact No. +46 74670808

Email: Carsten@marker.DK.

Date of Sample: 11th. December 2020.

ANALYSIS REPORT REFERENCE: 20-12-18878

Chemical Compositional

Parameter	Method of Analysis	Method Reference	Units	Reported Levels
Potassium as K.	ICP-OES	APHA 3500	% weight	3.598%
Phosphorus as P.	ICP-OES	APHA 3500	% weight	0.135%
Nitrogen as N. Organic (Ureic) Inorganic (Anionic)	Kjeldahl Distillation	APHA 3500	% weight	1.145% 1.120% 0.025%
Iron as Fe.	ICP-OES	APHA 3500	% weight	0.055%
Elemental Sulphur S.	Elemental Analyser	In-House Method	% weight	0.645%
pH Value	Electrometric	In-House Method	pH Units	8.15
Organic Matter	Elemental Analyser	In-House Method	% weight	88.70%
Specific Gravity	Densitometry	In-House Method	g/kg^{-1}.	1.086
Fulvic acid Content	RP-HPLC-PDA	In-House Method	% weight	0.468%

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Trace Minerals Analysis

Parameter	Method of Analysis	Method Reference	Units	Reported Levels
Magnesium as Mg.	ICP-OES	APHA 3500	g/kg.	5.550
Calcium as Ca.	ICP-OES	APHA 3500	g/kg.	10.350
Sodium as Na.	ICP-OES	APHA 3500	g/kg.	1.224
Manganese as Mn.	ICP-OES	APHA 3500	mg/kg.	151
Zinc as Zn.	ICP-OES	APHA 3500	mg/kg.	22
Copper as Cu	ICP-OES	APHA 3500	mg/kg.	12
Iodine as I_2	IC/ICP-OES	APHA 3500	mg/kg.	148
Selenium as Se	ICP-OES	APHA 3500	mg/kg.	15
Chromium as Cr	ICP-OES	APHA 3500	mg/kg.	0.300
Molybdenum as Mo.	ICP-OES	APHA 3500	mg/kg.	5
Boron as B.	ICP-OES	APHA 3500	mg/kg.	1.235

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Amino Acids Profile

Parameter	Method of Analysis	Method Reference	Units	Reported Levels
Glutamic acid	LC-MS	JHG-097	mg/100g	190
Aspartic acid	LC-MS	JHG-097	mg/100g	88
Arginine	LC-MS	JHG-097	mg/100g	66
Glycine	LC-MS	JHG-097	mg/100g	70
Alanine	LC-MS	JHG-097	mg/100g	37
Serine	LC-MS	JHG-097	mg/100g	29
Proline	LC-MS	JHG-097	mg/100g	78
Leucine	LC-MS	JHG-097	mg/100g	48
Tyrosine	LC-MS	JHG-097	mg/100g	52
Valine	LC-MS	JHG-097	mg/100g	41
Methionine	LC-MS	JHG-097	mg/100g	55
Histidine	LC-MS	JHG-097	mg/100g	17
Iso-Leucine	LC-MS	JHG-097	mg/100g	69
Cystine	LC-MS	JHG-097	mg/100g	48
Phenylalanine	LC-MS	JHG-097	mg/100g	21
Tryptophan	LC-MS	JHG-097	mg/100g	12

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Vitamin Profile

Parameter	Method of Analysis	Method Reference	Units	Reported Levels
Vitamin E	HPLC-PDA	JHG-088	mg/100g.	3.50
Vitamin B1	HPLC-PDA	JHG-088	mg/100g.	1.35
Vitamin B2 (Riboflavin)	HPLC-PDA	JHG-088	mg/100g.	1.105
Vitamin B3 (Niacin)	HPLC-PDA	JHG-088	mg/100g.	4.800
Vitamin B5 (Pantothenic acid)	HPLC-PDA	JHG-088	mg/100g.	1.224
Vitamin B6 (Pyridoxine)	HPLC-PDA	JHG-088	mg/100g.	0.665
Vitamin B12 (Cobalamine)	HPLC-PDA	JHG-088	µg/100g.	0.335
Vitamin C	HPLC-PDA	JHG-088	mg/100g.	14
Vitamin D	HPLC-PDA	JHG-088	IU/100g.	112
Vitamin K	HPLC-PDA	JHG-088	µg/100g.	48
Choline	HPLC-PDA	JHG-088	mg/100g.	92

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Sugars Analysis

Parameter	Method of Analysis	Method Reference	Units	Reported Levels
Carbohydrate Content	HPLC-PDA	ISO 11292	% mass	42.50%
Polysaccharides				24.100%
Alginic acid				8.850%
Laminarin				5.750%
Fucoidan				3.445%
Mannitol				4.100%
Glucopyranose				0.900%
Mannopyranose				1.115%

Plant Hormones Profile

Parameter	Method of Analysis	Method Reference	Units	Reported Levels
Betaines Content	HPLC-PDA	JHG-088	% weight	0.015%
Auxins Content	HPLC-PDA	JHG-088	ppm.	25
Gibberellins Content	HPLC-PDA	JHG-088	ppm.	21
Cytokinins Content	HPLC-PDA	JHG-088	ppm.	36
Strigolactones Content	HPLC-PDA	JHG-088	ppm.	1.115
Brassinosteroids Content	HPLC-PDA	JHG-088	ppm.	0.007

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Heavy Metals Analysis

Heavy Metal	Method of Analysis	Units	Reported Levels
Arsenic (Inorganic)	ICP-OES	mg/kg. (ppm)	0.424
Arsenosugars (Organic)	ICP/IC-OES	mg/kg. (ppm)	6.665
Antimony as Sb.	ICP-OES	mg/kg. (ppm)	< 0.002
Cadmium as Cd.	ICP/IC-OES	mg/kg. (ppm)	< 0.005
Mercury as Hg.	Cold Vapour A.A.S.	mg/kg. (ppm)	< 0.0001
Lead as Pb.	ICP-OES	mg/kg. (ppm)	< 0.002
Chromium as Cr^{6}+.	ICP/IC-OES	mg/kg. (ppm)	< 0.005
Nickel as Ni.	ICP-OES	mg/kg. (ppm)	< 0.002
Silver as Ag.	ICP-OES	mg/kg. (ppm)	< 0.0001
Vanadium as V.	ICP/IC-OES	mg/kg. (ppm)	< 0.0003
Tin as Sn.	ICP-OES	mg/kg. (ppm)	< 0.005
Aluminium as Al.	ICP/IC-OES	mg/kg. (ppm)	< 0.002

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Herbicide Residues Analysis

Parameter	Method of Analysis	Method Reference	Units	Reported Levels
Sulfonyl Ureas/Ureas	UHPLC-MS	APHA 6630	µg/gram.	< 0.004
Imidazolinones/Diphenylethers	UHPLC-MS	APHA 6630	µg/gram.	< 0.005
Phenoxy/Chlorophenoxy	UHPLC-MS	APHA 6630	µg/gram.	< 0.006
Dinitroalinine/Acetamides	UHPLC-MS	APHA 6630	µg/gram.	< 0.002
Bipyridillums/Triketones	UHPLC-MS	APHA 6630	µg/gram.	< 0.004
Thicarbamates	UHPLC-MS	APHA 6630	µg/gram.	< 0.035
Glyphosate/Glufosinate	UHPLC-MS	APHA 6630	µg/gram.	< 0.002
Atrazine desethyl deisopropyl	UHPLC-MS	APHA 6630	µg/gram.	< 0.001
Atrazine deisopropyl	UHPLC-MS	APHA 6630	µg/gram.	< 0.003
Atrazine desethyl	UHPLC-MS	APHA 6630	µg/gram.	< 0.002
Simazine	UHPLC-MS	APHA 6630	µg/gram.	< 0.005
Terbutylazine desethyl	UHPLC-MS	APHA 6630	µg/gram.	< 0.001
Atrazine	UHPLC-MS	APHA 6630	µg/gram.	< 0.001
Terbutryn	UHPLC-MS	APHA 6630	µg/gram.	< 0.001
Terbutylazine	UHPLC-MS	APHA 6630	µg/gram.	< 0.001
Alachlor	UHPLC-MS	APHA 6630	µg/gram.	< 0.004
Metolachlor	UHPLC-MS	APHA 6630	µg/gram.	< 0.005
Aminopyralid	LS-MS-MS	APHA 6630	µg/gram.	< 0.001
Clopyralid	LS-MS-MS	APHA 6630	µg/gram.	< 0.001
Triclopyr	LS-MS-MS	APHA 6630	µg/gram.	< 0.002

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Pesticide Residues Analysis

Parameter	Method of Analysis	Method Reference	Units	Reported Levels
Organochlorine Residues	UHPLC-MS	APHA 6630	µg/gram.	< 0.002
Organophosphorus Residues	UHPLC-MS	APHA 6630	µg/gram.	< 0.002
Organonitrogen Residues	UHPLC-MS	APHA 6630	µg/gram.	< 0.050
Carbamate Pesticides	UHPLC-MS	APHA 6630	µg/gram.	< 0.030
Pyrethroid Residues	UHPLC-MS	APHA 6630	µg/gram.	< 0.001
Organotin Residues	UHPLC-MS	APHA 6630	µg/gram.	< 0.002

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Genetically Modified Micro-organisms Analysis

GMO	Method of Analysis	JHG-FT-055	Units	Result
DNA-Based GMO	PCR Method	ASTM D8196-18	CFU/ml.	Absent
RNA-Based GMO	PCR Method	ASTM D8196-18	CFU/ml.	Absent

Assessment Conclusion

All test methods were performed in accordance with the requirements of ISO: IEC 17025.

The test results relate only to the product listed in this report.

Based on the information derived, the TourTurf Algae Plus Seaweed shows the sample to be assessed as compliant with EU Regulations for the absence of DNA-Based and RNA-Based GMO and can be labelled as tested to these standards and specifications in support of any claim relating to the test and data reported.

Analytical Assessor

John Gough B.Sc. M.Sc.

Assessor Credentials

B.Sc (Hons) in Analytical Chemistry with Quality Management.

M.Sc in Environmental Chemistry.

Full Member of Royal Society of Chemistry (RSC).

Research Fellow at Trinity Biomedical Science Institute (Dublin).

J.W. GOUGH

_____**Technical Signatory.**

Dated: 28th. December 2020