Grodan Stone Wool Alternative Use Applications

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Part of the ROCKWOOL Group

Grodan Stone Wool Alternative Use Applications

After the growing cycle is complete, Grodan's stone wool growing media retains useful raw materials for recycling applications.

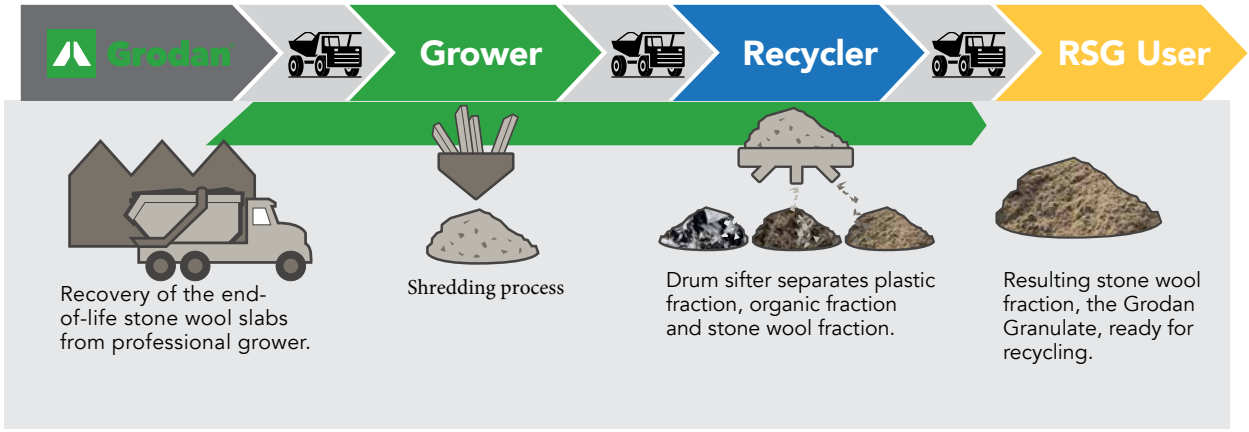
What is RSG?

Re-usable Stone Wool Granulate (RSG) is a term referencing the used stone wool product recovered from growers and cultivators. Used stone wool is processed on-site, per local and state laws, until it is rendered to a granulate product. RSG is an inert and non-hazardous material with multiple applications in the compost, soil, brick & heavy clay, and plastic industries.

Secondary Applications

- COMPOST
- POTTING MIX
- EROSION CONTROL
- INDUSTRIAL BEDDING
- HEAVY CLAY
- PLASTIC ADDITIVES

RSG Characteristics	
Density 450 kg/m3	450 kg/m^3
Plastic Percentage 1.5 %	1.5 %
Roots/Stems 10 %	10 %
Water Retention Capacity CF 793.74 ml/l	793.74 ml/l
Easy Water Available 516.68 ml/l	516.68 ml/l



Recycling Fractions	plastic wrapping	- plastic granulate
	organic waste	- composting
	drainage water	- water treatment
	Reusable Substrate Granulate (RSG)	- raw material for various application

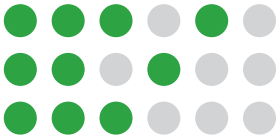
Lucideon Materials Dossier

The Use of Recycled Grodan Granulate in Heavy Clay Construction Products:

Benefits from RSG in Brick, Heavy Clay, and Plastic Applications:

Preparation Forming & Drying

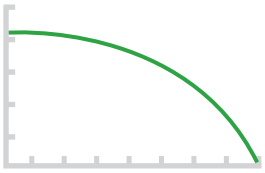
- easily mixed with clay to aid in the forming process
- clay body reinforcement
- faster drying



GRODAN Granulate is easily mixed with clay to aid the forming process, enable faster drying, improve firing process and final fired properties, while reducing environmental impact.

Firing Process

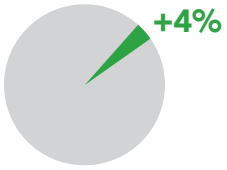
- lower firing temperature for bricks and clay
- higher igniting temperature for plastics
- fluxing material



The granulate acts as a flux and lowers the firing temperature, needed to reach vitrification (degree of glass melting). Therefore, the desired technical properties can be achieved at lower temperatures.

Product Properties

- increase in fired strength
- decrease in density
- increase in insulation properties
- unaffected durability
- lowers use of flame retardants by making product less ignitable



In general, when using the GRODAN granulate as an additive in the clay body, there is a slight increase in fired strength, especially when the granulate is added at rates above 4%. The fired gross density is reduced resulting in increased insulation properties and unaffected durability.

Compost Data & Figures

Reusable Stonewool Granulate "RSG" in Compost Applications

Chemical & Physical Properties of RSG

	Unit	RSG1	RSG2	RSG3	RSG4	Average	SD[3]
Water Retention Capacity	mL/L	570,9	487,46	522,96	542,43	**530,94**	35,04
Air retention Capacity	mL/L	315,1	399,99	351,13	336,22	**350,61**	36,09
Air/Water	-	0,55	0,82	0,67	0,62	**0,67**	0,11
Water Retention Capacity	% dm	207,76	172,98	167,49	180,82	**182,26**	17,86
Dry Bulk Density	g/L	274,79	281,80	312,23	299,98	**292,20**	17,06
Porosity	% of volume	88,60	88,74	87,41	87,86	**88,15**	0,63
pH	-	6,94	7,30	6,88	6,56	**6,9**	0,3
Conductivity Extraction 1/5	(mS/cm)	305,00	240,00	105,00	250,00	**225,0**	85,0

Fertilizing Characteristics

	Unit	RSG1	RSG2	RSG3	RSG4	Average	SD
Humidity	% RM[4]	58,8	44,6	53,0	67,4	**56,0**	9,6
Dry Matter	% RM	41,2	55,4	47,0	32,6	**44,1**	9,6
Mineral Content	% RM	35,5	50,9	42,4	29,3	**39,5**	9,3
Organic Material	% RM	5,77	4,56	4,54	3,31	**4,55**	1,00
Major-nutrients (Extraction of aqua regia soluble elements according to EN ISO 13650)							
Total Nitrogen (N)	g/kg RM	4,6	3,6	3,2	2,3	**3,4**	1,0
Phosphorus (P_2O_5)	g/kg RM	12,8	31,5	4,6	18,8	**16,9**	11,3
Potassium (K_2O)	g/kg RM	4,4	5,5	4,5	3,6	**4,5**	0,8
Magnesium (MgO)	g/kg RM	22,6	36,9	29,9	20,3	**27,4**	7,5
Calcium (CaO)	g/kg RM	69,1	117,4	67,0	71,1	**81,2**	24,2

Micronutrients Available

	Unit	RSG1	RSG2	RSG3	RSG4	Average	SD
Micro-nutrients (CAT leaching analysis according to test method EN ISO 13651)							
Zinc (Zn)	mg/kg dm	44	79	40	201	**91**	75
Copper (Cu)	mg/kg dm	5,0	5,4	5,8	22	**9,6**	8,3
Iron (Fe)	mg/kg dm	858	1000	1300	788	**987**	227
Manganese (Mn)	mg/kg dm	86	300	94	251	**183**	109
Boron (B)	mg/kg dm	6,2	4,6	< 4	14	**8,3**	5,0
Molybdene (Mo)	mg/kg dm	2,5	0,6	40	3,4	**11,6**	19

All results obtained from Staphyt Sarl - January 2018

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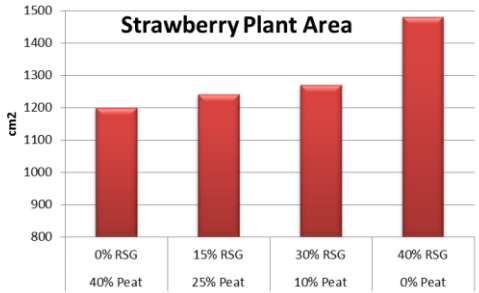
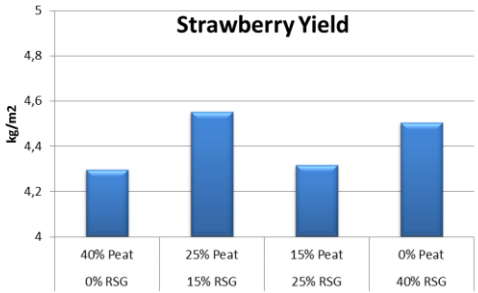
CASE STUDY: Strawberry Trials with INVENIO

Reference:	40% peat, 60% bark	Gariguette Strawberry (800h cold)
Test slab 1:	10% RSG, 30% peat, 60% bark	**Environment:**
Test slab 2:	25% RSG, 15% peat, 60% bark	Multispan Greenhouse
Test slab 3:	40% RSG, 60% bark	



Vegetative growth:
Strawberry plant area increases with higher RSG content resulting in higher water uptake and higher EC



Strawberry yield:
Higher yield for RSG containing substrates.

Final Report Invenio: Sept. 2017

CASE STUDY: Ornamentals with Astredhor

1. Petunia *(potted plant, green house conditions)*
2. Photinia X Fraseria *(nursery trees, outdoor conditions)*
3. Sedum *(roof substrate, outdoor conditions)*

All substrates partially replaced with RSG

Reference = 100% substrate
Substrate 1 = 75% substrate/25% RSG
Substrate 2 = 50% substrate/50% RSG

Overall results: Addition RSG results in more homogeneous root development (top/bottom): less roots on bottom side.

Petunia: Better root development for RSG containing substrates; higher plant height and diameter;

Photinia X Fraseria: Slightly better root development for RSG containing; only small differences in plant growth;

Sedum: RSG addition results in wetter substrate, plant growth had varying increases dependent upon species

ASTREDHOR SUD-OUEST GIE Fleurs et Plantes

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Report Evidence Package

Reusable Substrate Granulate (RSG), Eck M., Seignovert C., Staphyt, January 2018

RSG Substrate Trials

RSG Application and Peat Replacement for strawberry substrate, green roof substrate, nursery tree substrate
Bottom Line: RSG changes physical structure of the substrate increasing aeration, porosity, water availability. This leads to better and more homogenous root & plant development.

Legislation - Growing Media

Compliancy with French regulation
French Standard NF U 44 551 – Growing Media
French Standard NF U 44 051 – Soil Improver

RSG complies with French standards for use as growing media and in soil improvers.

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