



## **EU REGULATION ON THE USE OF SLUDGE**

**REGULATION (EC) No 1774/2002 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 3 October 2002 laying down health rules concerning animal by products not intended for human consumption**

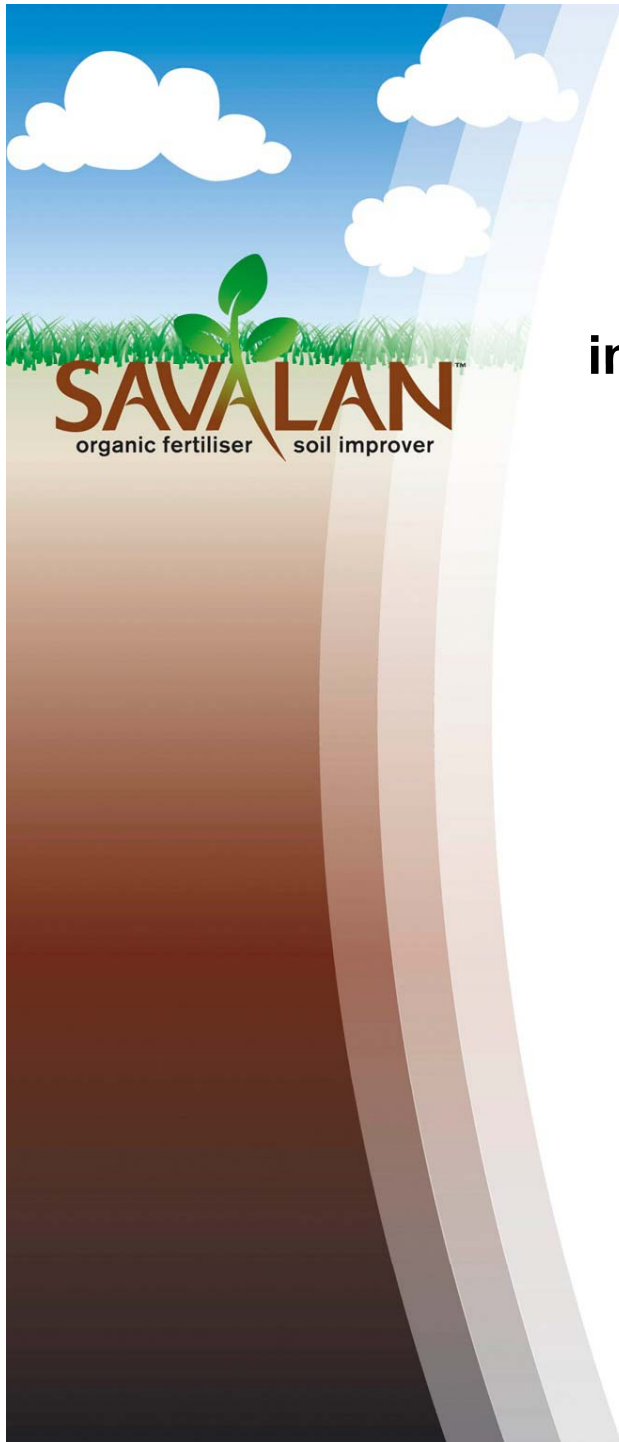
**REGULATION (EC) No 2003/2003 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 October 2003 relating to fertilizers**

**Commission Regulation (EC) No 181/2006 of 1 February 2006 implementing Regulation (EC) No 1774/2002 as regards organic fertilisers and soil improvers other than manure and amending that Regulation**

**Commission Regulation (EC) No 208/2006 of 7 February 2006 amending Annexes VI and VIII to Regulation (EC) No 1774/2002 of the European Parliament and of the Council as regards processing standards for biogas and composting plants and requirements for manure**

## **PROTECTION OF BALTIC SEA**

**Convention on the Protection of the Marine Environment of the Baltic Sea Area, 1992. The 1992 Helsinki Convention entered into force on 17 January 2000. This issue includes the amendments to its Annexes adopted by the Helsinki Commission in 2000, 2001 and 2003.**



## Typical amounts of various microorganisms in untreated sewage sludge (amount per g of ww)

Bacteria	<i>E. coli</i>	$10^6$
	<i>Salmonella</i>	$10^2-10^3$
Virus	Enterovirus	$10^2-10^3$
Protozoa	Giardia	$10^2-10^3$
Worms	<i>Ascaris</i>	$10^2-10^3$
	<i>Toxocara</i>	$10^1-10^2$
	<i>Taenia</i>	5

Source: EC 2001



## Survival time of some microorganisms in soil

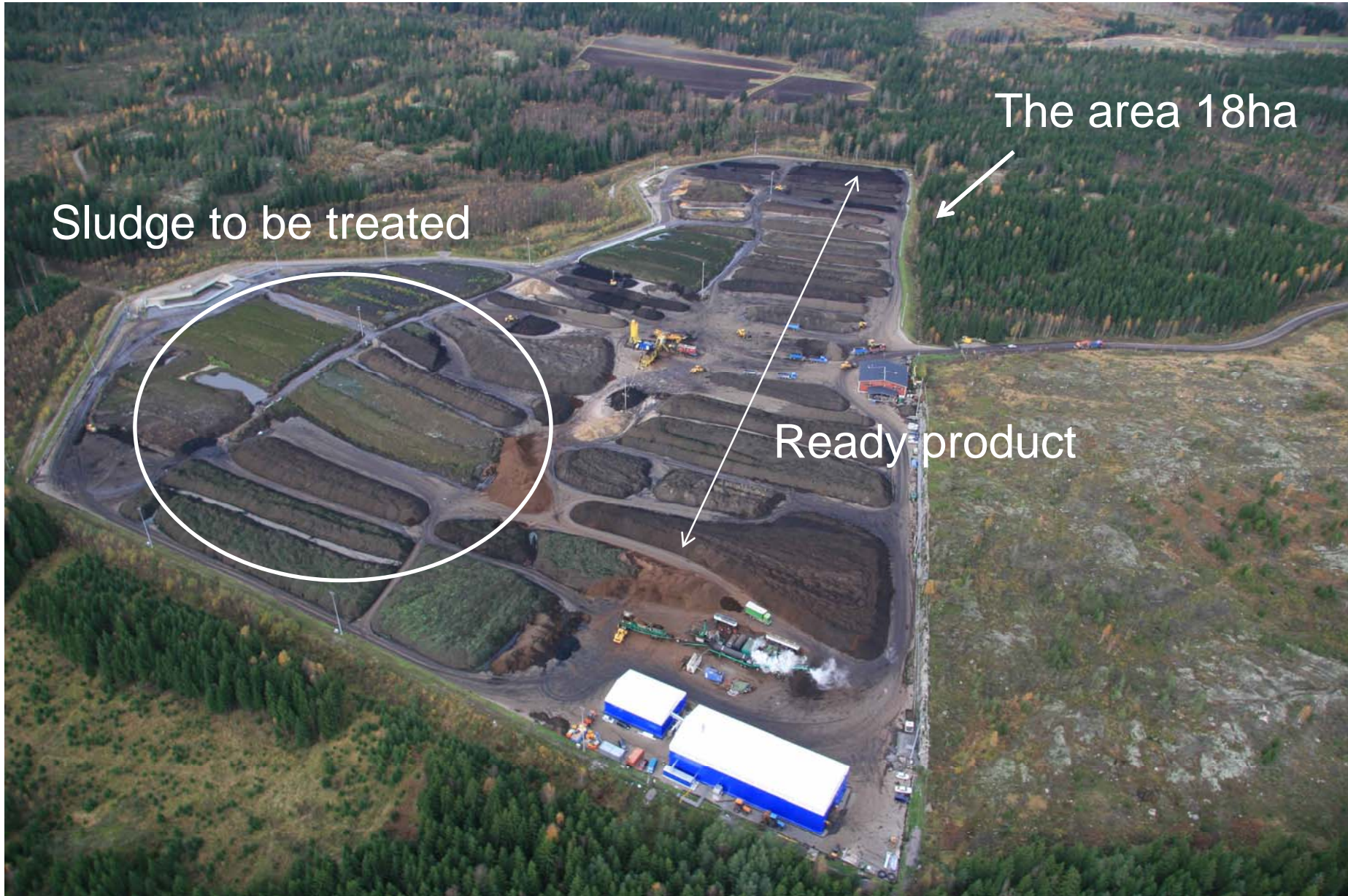
Micro-organism	Soil 20-30°C	Max in soil*	In crop 20-30°C	Max in crop*
Fecal coli	20-70d	0.2-1y	15-30d	1-6th
<i>Salmonella</i>	20-70d	0.2-1y	15-30d	1-6th
Viruses	20-100d	0.4-1y	15-60	1-6th
Protozoa** (amoeba)	10-20d	2-10d	2-10d	2-5d
Worm eggs	Few months	2-7y	30-60d	0.5-1y

\* = depends on temperature, moisture etc.

\*\* = Giardia and Cryptosporidium will live probably longer as cysts

Source: Feachem et al 1983, Kowal 1985 and EPA 1999









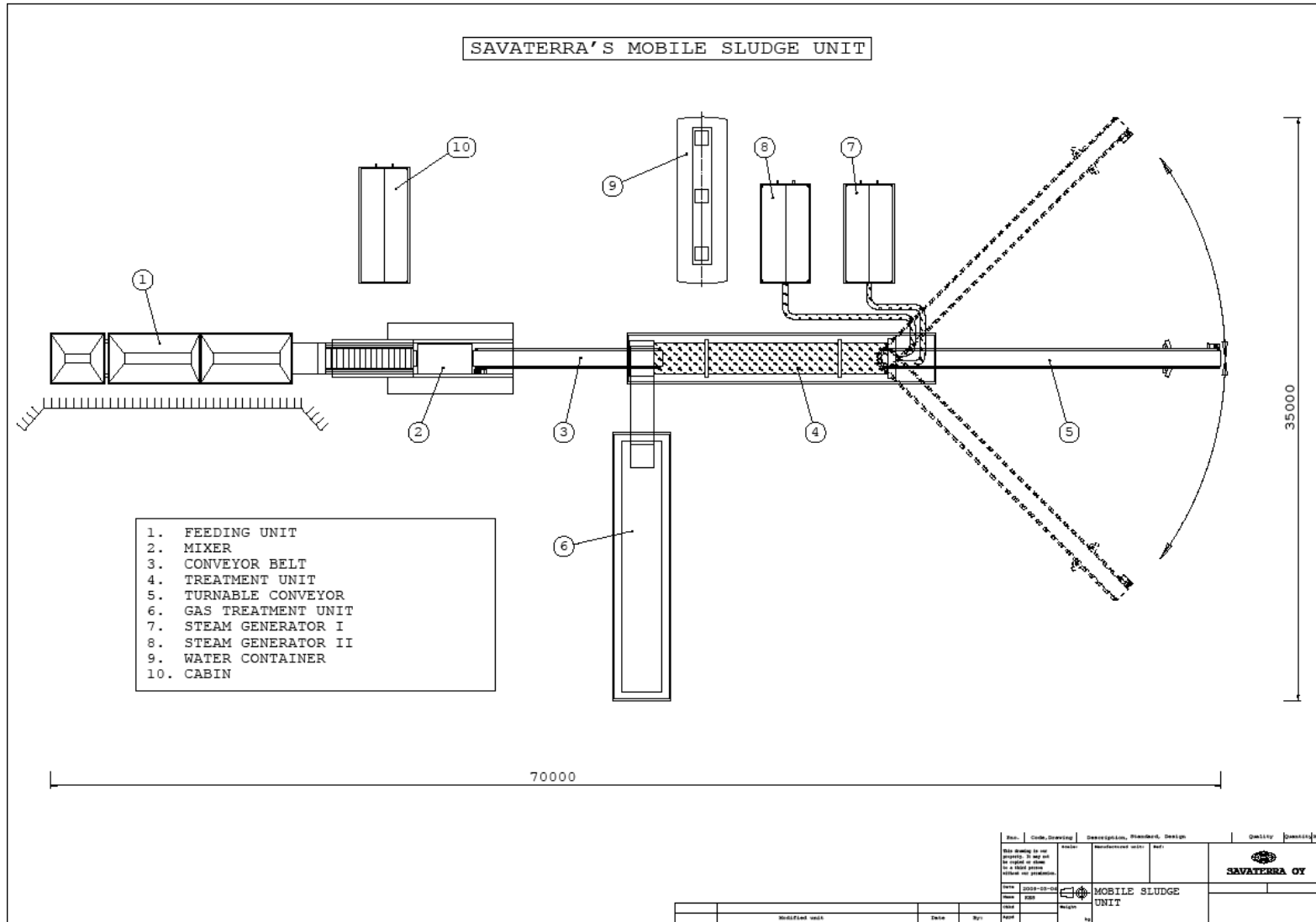
Savaterra's mobile sludge treatment unit  
-capacity 70-80t/h: Model generation 1





Savaterra's mobile sludge treatment unit

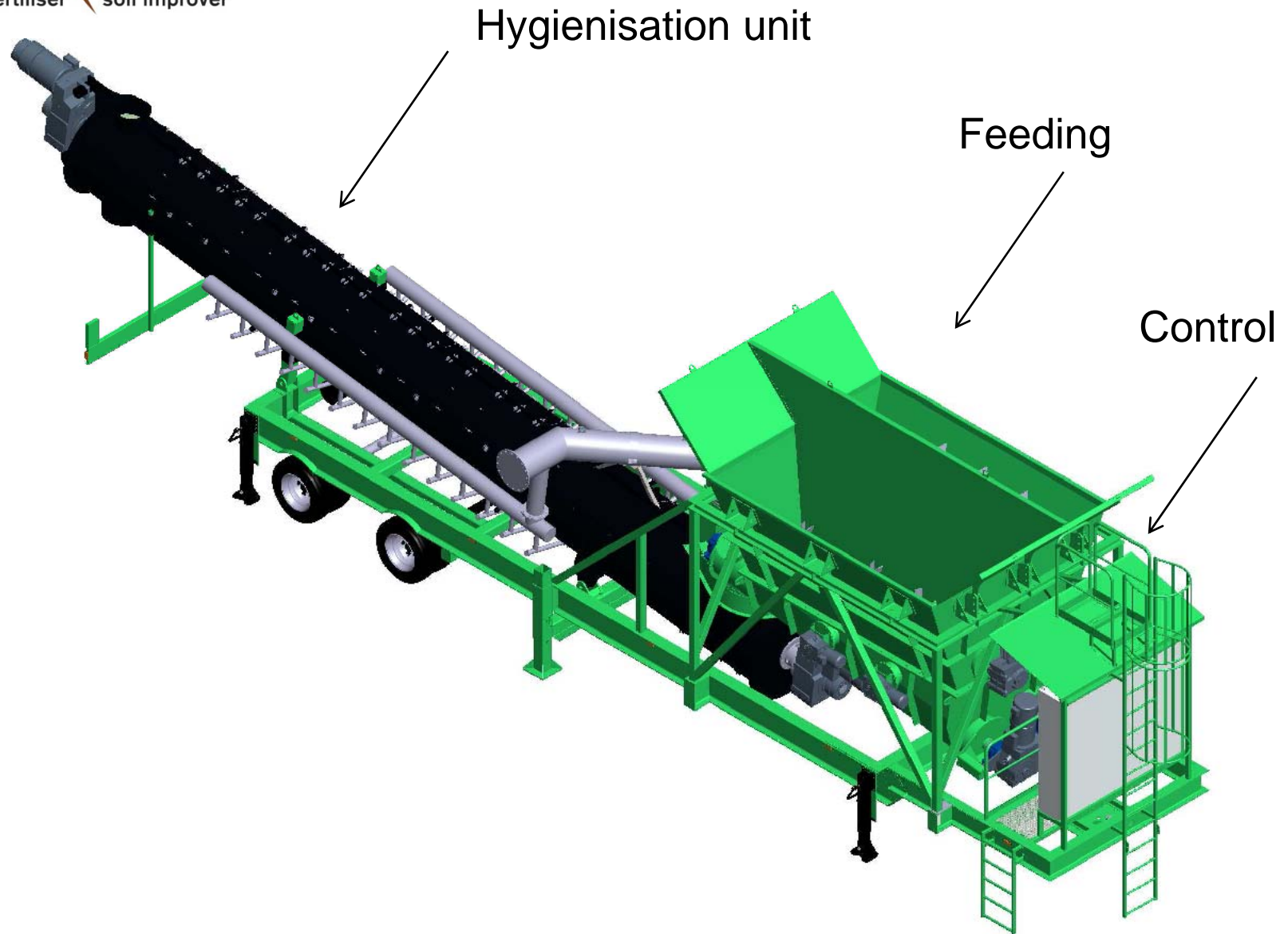








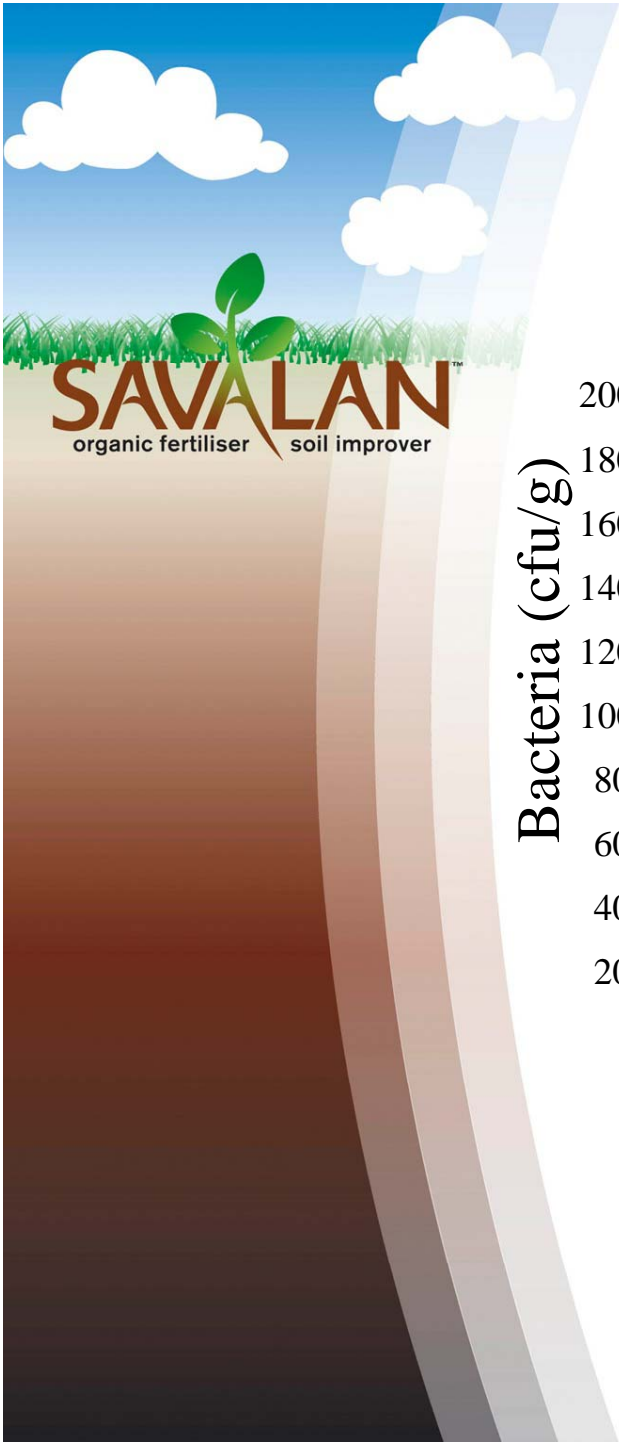
## Mobile sludge treatment unit: Generation 3



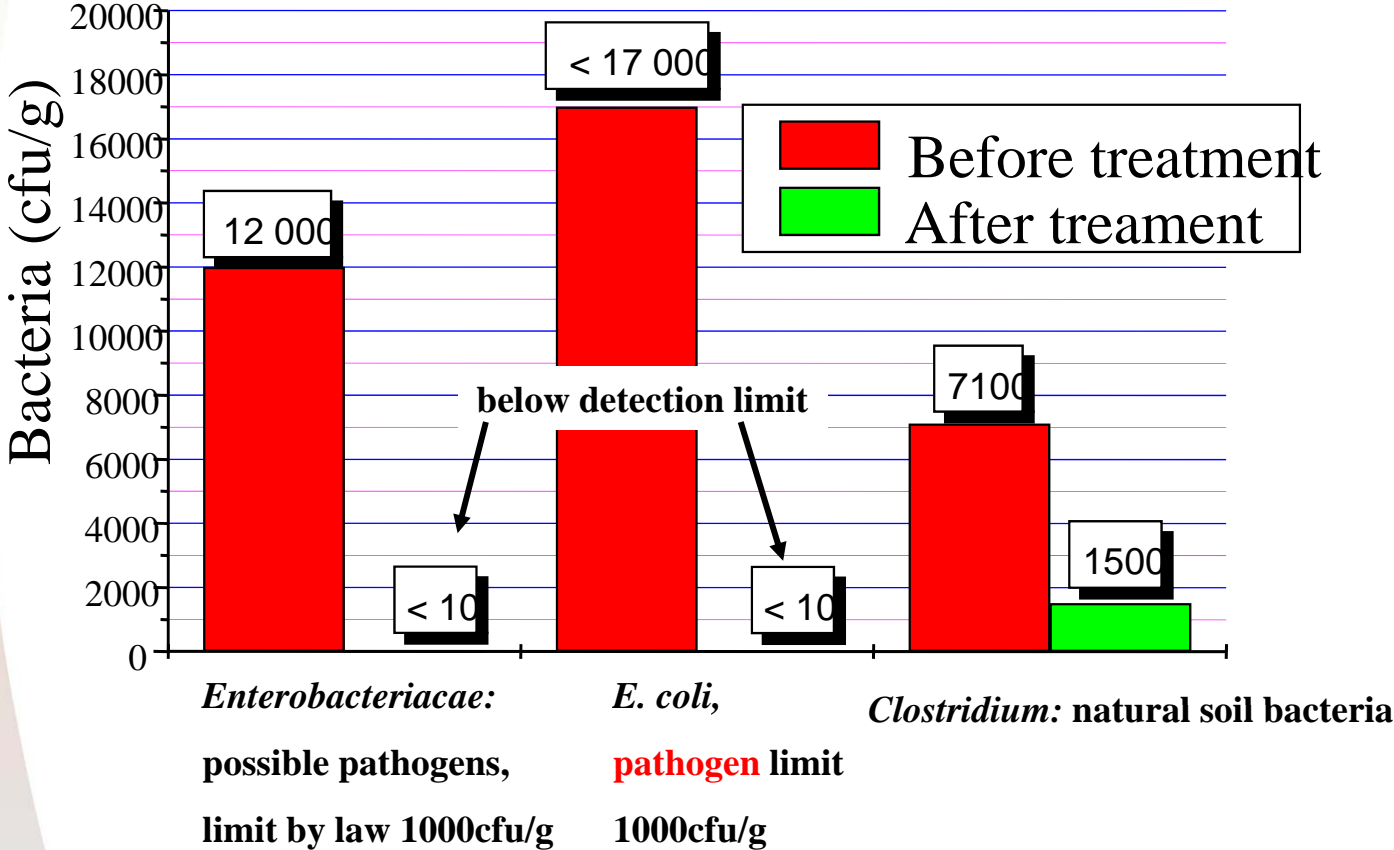


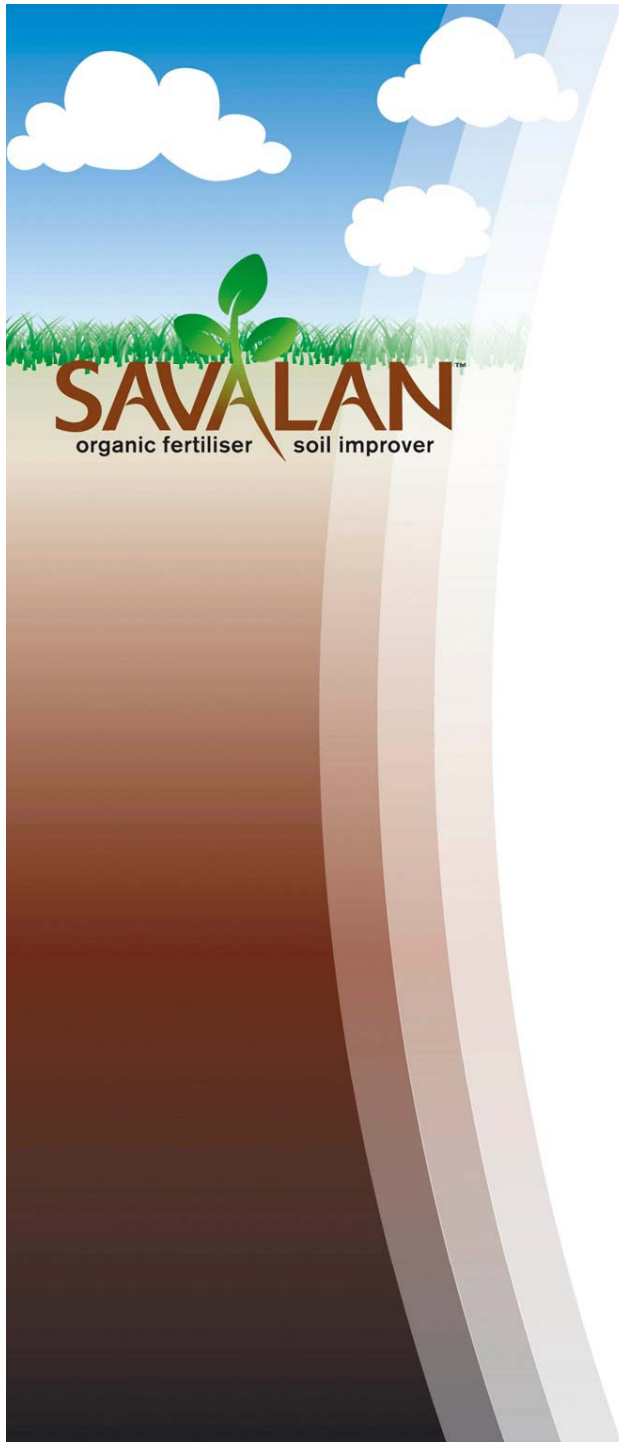
## Mobile sludge treatment unit: Generation 3





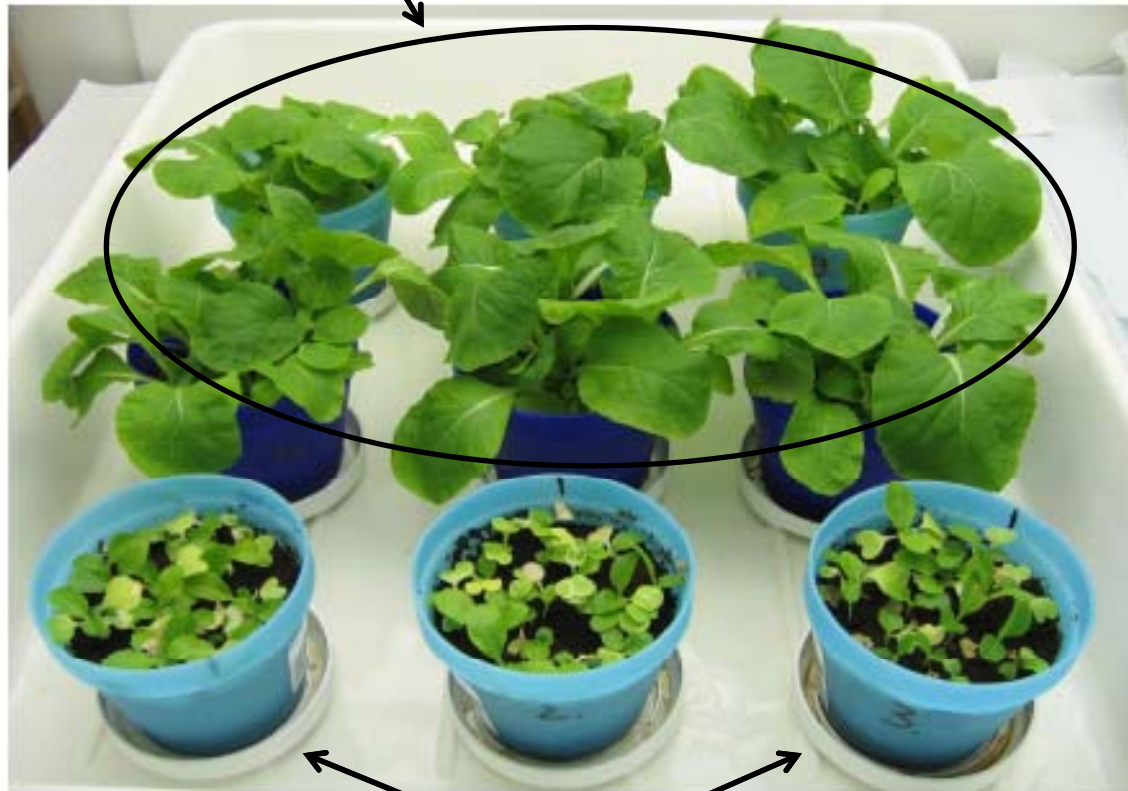
**Microbiological properties of the treated material before and after Savaterra's process: properties are excellent and according EU-directives**





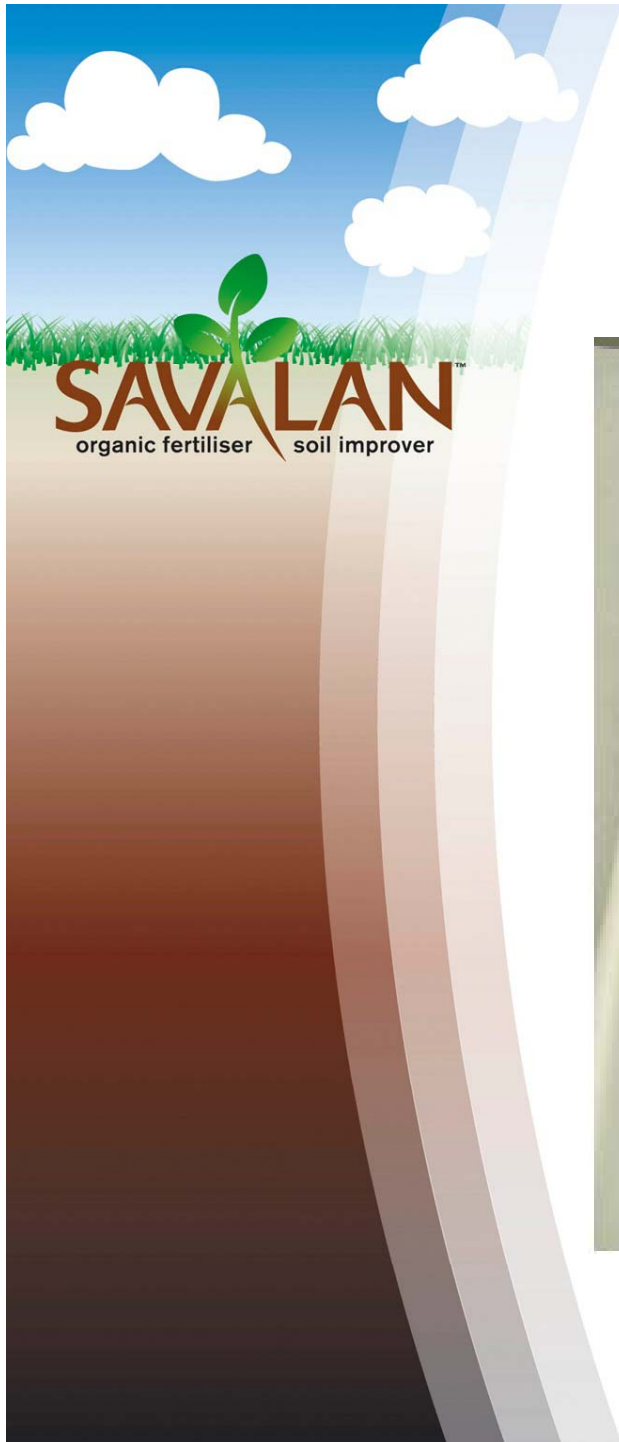
## Determination of plant growth response – A pot test with Chinese gabbage

Growth on Savalan



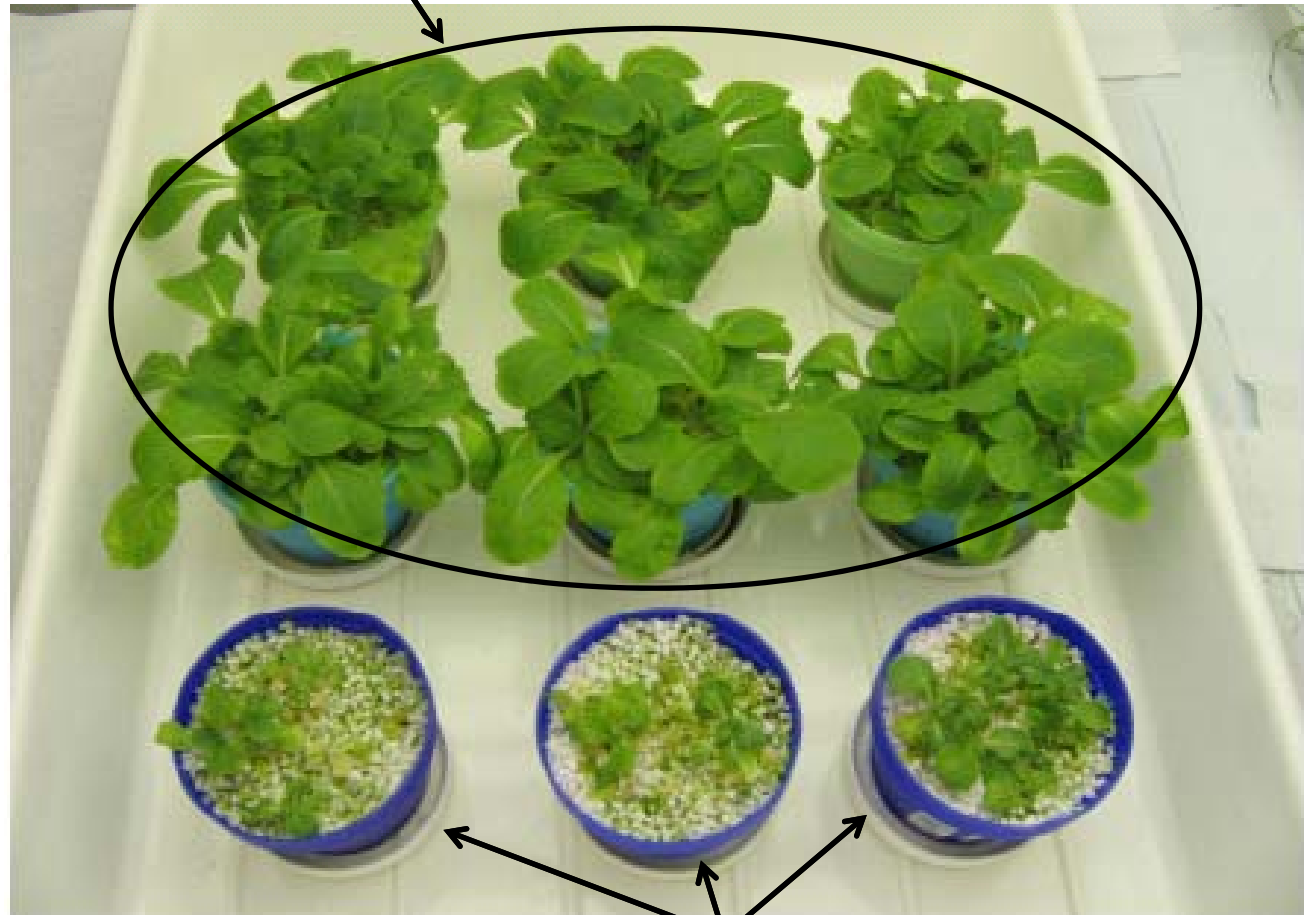
Reference material: growth peat



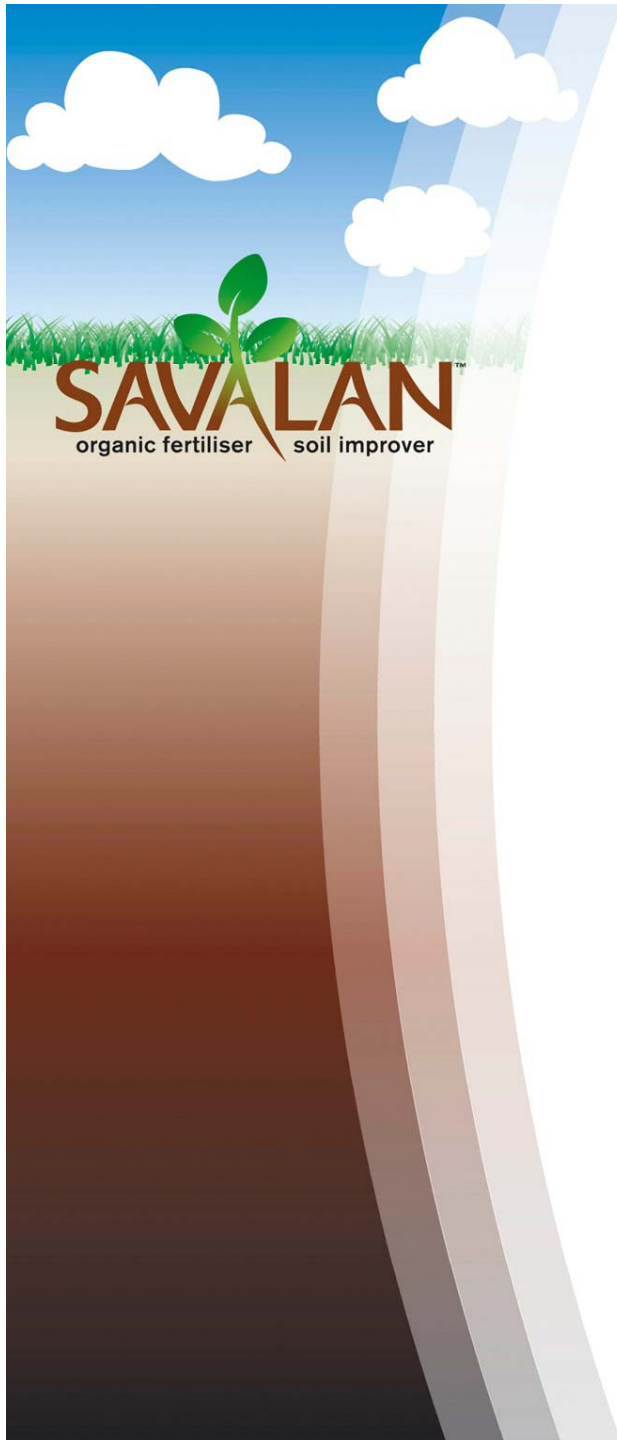


## Determination of plant growth response – A pot test with Chinese gabbage

Growth on Savalan



Reference material: hydroponic cultivation  
with perlite



## Where can Savalan be applied and why

**Who regulates** the use of ww sludge originating Products in Finland?

- Finnish Food Safety Authority ([www.evira.fi](http://www.evira.fi))  
(a member of European Food Safety Authority, [www.efsa.europa.eu](http://www.efsa.europa.eu) )
- when product fullfils chemical, physical and microbiological quality it can be sold. Otherwise selling is forbidden.
- extensive sampling is done every 5000t

**Where** the ready product can be sold?

- green building or gardening purposed
- for agriculture as soil improving material
- in Helsinki area: for crop fields

2009: 60 000t

2010: 40 000t (estimate)

## Comparison of the treatment methods



	Savaterra	Sludge drying	Composting	Chemical treatment
<b>Total cost of treatment (€/t)</b>	30	50	30	50
<b>Product quality for agriculture</b>	excellent*	poor**	good***	poor****
<b>Possible selling price of the product (€/t)</b>	10	0	5	3
<b>Possible subcidicing from government to treatment price (50%, €/t)</b>	15	25	15	25
<b>Real price when subcidiced (€/t)</b>	5	25	10	22
<b>Real price if not subcidiced (€/t)</b>	20	50	25	47
<b>Need invest to treatment machinery (€)</b>	none	5 000 000	5 00 000	1 000 000
<b>Capacity of one unit (t/h)</b>	70	15	5	10
<b>Space requirement by the method</b>	small	small	very large	large
<b>Smell emissions</b>	very small	average	large	large
*EU standards fulfilling organic soil improver, possible additional will be included into price depending on the end use of the material				
**loss on nutrients due to heating and concentration of heavy metals				
***slow process, 1 part of sludge 2 parts of other material-> 1:3 ratio-> increase of material				
****loss of nutrients, smell problems				



## Savaterra product features:

- Amount of organic material must be at least 25 % of DW
- Plant root growth index > 80 %
- $\text{NO}_3\text{-N}/\text{NH}_4\text{-N}$  ratio >1
- $\text{CO}_2$  production <3 mg  $\text{CO}_2\text{-C/g VS/d}$
- no *Salmonella* in 25g of the ready product
- *Escherichia coli* no higher than 1000 cfu/g DW of the material
- Heavy metals max. (mg/kg DW)

Element	Agriculture	Forestry
As (mg/kg)	25	30
Hg (mg/kg)	1,0	1,0
Cd (mg/kg)	1,5	15
Cr (mg/kg)	300	300
Cu (mg/kg)	600	700
Pb (mg/kg)	100	150
Ni (mg/kg)	100	150
Zn (mg/kg)	1500	4500

Contaminant	Maximum
Weed seeds in the ready packed products	2 seeds per litre
Weed seeds in the ready unpacked products	5 seeds per litre or marked that product contains wind spreading weed seeds
Garbage such as glass, metals, plastics, bones, stones	Packed products 0,2 % of fresh weight  Unpacked products 0,5 % of fresh weight
Wildoat	Not detectable
Plant parts (detected in garbage analysis)	No living roots or pieces of them as well as no vegative growth capable pieces of plants