

Ris 377 Ed2**Disintegration in composting conditions of The NatureUrn**
Final report

Project number	Ric1262
Internal Client	A. Castellanza
Testing Facility	Novamont S.p.a. – Biodegradation Laboratory via Fauser 8, 28100 Novara Italy-
Test Item	Nordmark Jacobsen / NatureUrn
Test Duration	180 days (6 months)
Study Personnel	M. Tosin : Study Director M. Barbale : Technician R. Bertani : Quality Assurance
Study schedule	Study initiation date: Sept-20-2010 Experimental starting date : Sept-20-2010 Experimental completion date : Mar-09.2011
Archiving	All raw data and records are stored in the Laboratory archive A21 room B112, File “Composting” 965c raw dates , File “RIC”1262 study plan and File “RIS” 377 e 377 Ed2 final report.

Summary and conclusion

The disintegration of the test item, was tested in composting conditions at 58°C according to ISO20200:2004 *“Plastics -- Determination of the degree of disintegration of plastic materials under simulated composting conditions in a laboratory-scale test”*. After 90 days of test , the disintegration is partial, still large pieces of test material are visible and retrievable . Normally, to simulate a composting process, the duration of the test is 90 days, in this case the goal of the work is to characterise the disintegration of the test item in a accelerated laboratory test method , in fact the end of life of the NatureUrn is in soil, where the biodegradation will be active for long time (several years) so we decided to continue the accelerated test until 180 days. At the end of the test we calculated a 85.8% of weigh loss, still residuals (similar to pieces of wood) are recoverable from the compost. These residuals haven't proprieties and crushed between the fingers with light pressure became sawdust.

Based on the results of accelerated test and for the wood chips content and accounting for the urn only being exposed on one side in the ground, we can conclude that the urn will fully degrade in soil at low temperature. The degrading time will naturally be longer than on the accelerated test, based on the results summarised in the report it is likely to be fully degraded within 7-9 years in soil at 5-6 °C.

Principle of the test method

The ISO20200 *Plastics- Determination of the degree of disintegration of plastic materials under simulated composting conditions in a laboratory-scale test* specifies a method of determining the degree of disintegration of plastic materials when exposed to a laboratory-scale composting environmental. The method simulate an intensive aerobic composting process. It is necessary to use a synthetic solid waste (sawdust, rabbit food, starch, sugar, urea, oil) inoculated with mature compost taken from a commercial composting plant. Pieces of a plastic material are composted with the synthetic waste. At the end of the test the degree of disintegration is determined by sieving the final compost in order to recover the non-disintegrated residues of the test material. The weigh loss of the material is considered as disintegrated material. We are documented the disintegration process with a series of photos.

Materials and Methods

Pieces of the NatureUrn (fig. 1) were blended with the synthetic waste, according to ISO normative (fig. 2), the thickness of the sample is about 3 mm. We prepared 2 test reactors, one to determine the weigh loss collecting the samples during the test and the other for the final sieving of the compost.



Figure 1 : The NatureUrn



Figure 2 : samples and synthetic waste

Results

In tables 1,2,3 and in figures 3,4,5 are summarised the results. In particular in table 1 the trend of weigh loss, in table 2 the raw date and table 3 notes and comments during the test.

Time (days)	Weigh loss (%)
0	0
45	21.8 (\pm 1.6)
90	47.4 (\pm 2.2)
180	85.8

Table 1

The NatureUrn: Initial weigh (g)	The NatureUrn : Final weigh after 180 days of composting	Weigh Loss % (Disintegration)
60,39	8.5707	85.81

Table 2

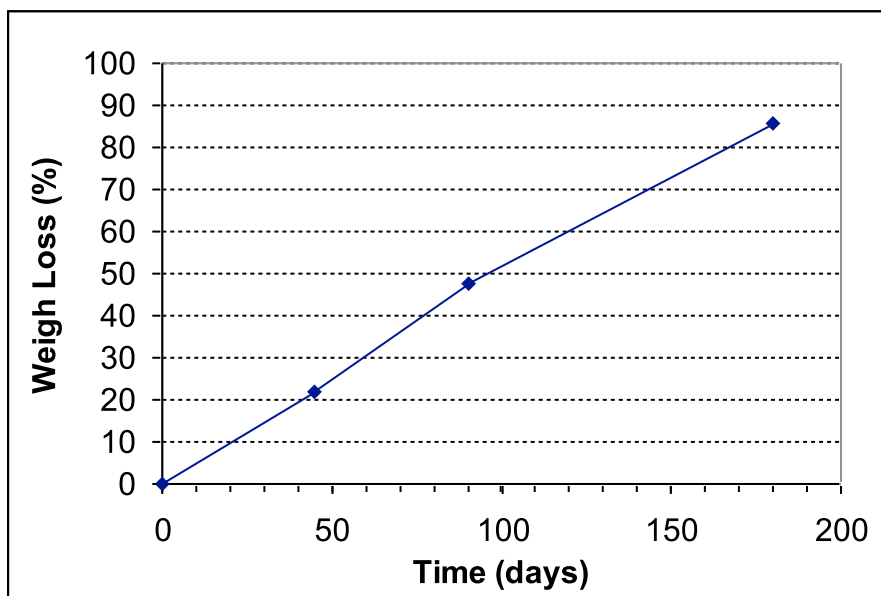
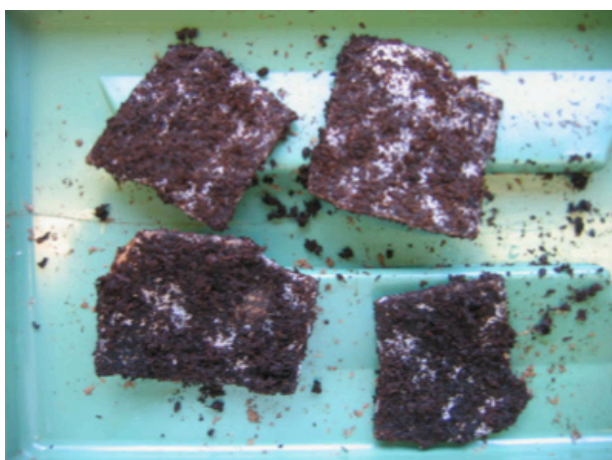
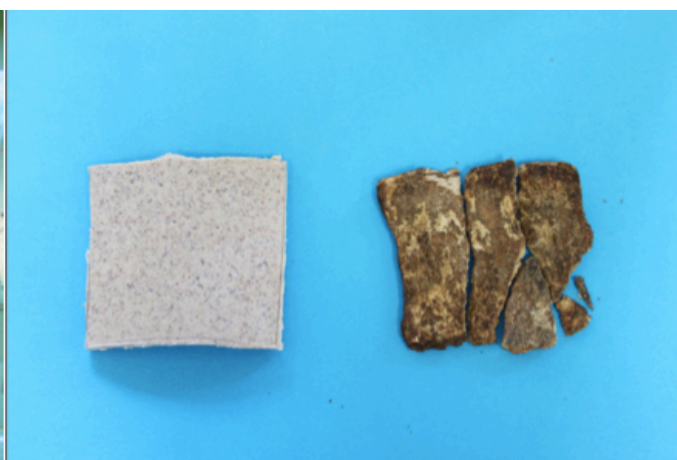


Figure 3 : Trend of Disintegration

Elaborating the disintegration trend with a linear regression ($R=0.996$) we can estimate a total disintegration (100% weigh loss) after 205 days.

Date	Days	Notes and comments
Oct-10	14	The samples are intact, only some mould on the surface
Oct-20	30	The samples are covered with mould and brittle
Nov-04	45	-
Nov-23	64	Samples are very brittle
Dec-17	89	Little parts of the samples are disintegrated
Jan-18-2011	120	The samples are very brittle and broken in little pieces
Feb-17-2011	150	Little and brittle pieces covered of compost

Table 3*Figure 3 : Situation after 45 days**Figure 4 : Situation after 90days*

