Ris 377 Ed2

Disintegration in composting conditions of SP Moulding Urn

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	**SP Moulding Urn / 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 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 the 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,weight the end of life of the SP Moulding urn is in soil, where the biodegradation will be active for a 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% weight loss, still residuals (similar to pieces of wood) are recoverable from the compost. These residuals haven't properties and when crushed between the fingers with light pressure became sawdust.

Based on the results of the 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 degradation time will naturally be longer than in 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 ºC.

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 environment. The method simulates 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 weight loss of the material is considered as disintegrated material. We have documented the disintegration process with a series of photos.

Materials and Methods

Pieces of the SP Moulding Urn (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 weight loss collected samples during the test and the other for the final sieving of the compost.



Figure 1 : SP Moulding Urn



Figure 2 : samples and synthetic waste

Results

In tables 1,2,3 and in figures 3,4,5,6 are summarised the results. In particular in table 1 the trend of weight loss, in table 2 the raw data and table 3 notes and comments during the test.

Time (days)	Weight loss (%)
0	0
45	21.8 (± 1.6)
90	47.4 (± 2.2)
180	**85.8**

Table 1

SP Moulding Urn : Initial weight (g)	SP Moulding Urn : Final weight after 180 days of composting	Weight Loss % (Disintegration)
60,39	8.5707	85.81

Table 2

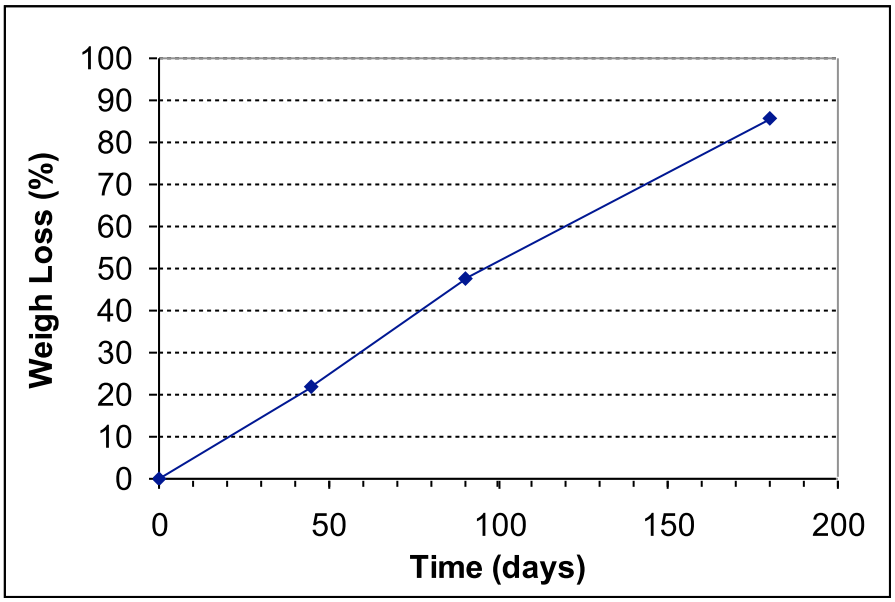

Figure 3 : Trend of Disintegration

Elaborating the disintegration trend with a linear regression (R=0.996) we can estimate a total disintegration (100% weight 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 are brittle
Nov-04	45	-
Nov-23	64	Samples are very brittle
Dec-17	89	The samples are disintegrated into small parts
Jan-18-2011	120	The samples are very brittle and broken in small pieces
Feb-17-2011	150	Small and brittle pieces covered of compost

Table 3

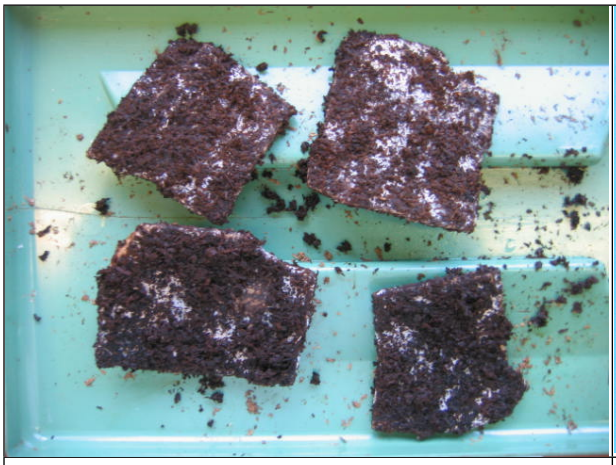

Figure 3 : Situation after 45 days



Figure 4 : Situation after 90 days



Figure 5 : Residues at the end of the test Final weight



Figure 6 : Residues at the end of the test after being lightly crushed between the fingers.