THE ROTHAMSTED CARBON MODEL

Name : RothC-26.3
Authors: K. Coleman and D.S. Jenkinson, 1999)
Address : IACR - Rothamsted, Harpenden, Herts, AL5 2JQ, UK
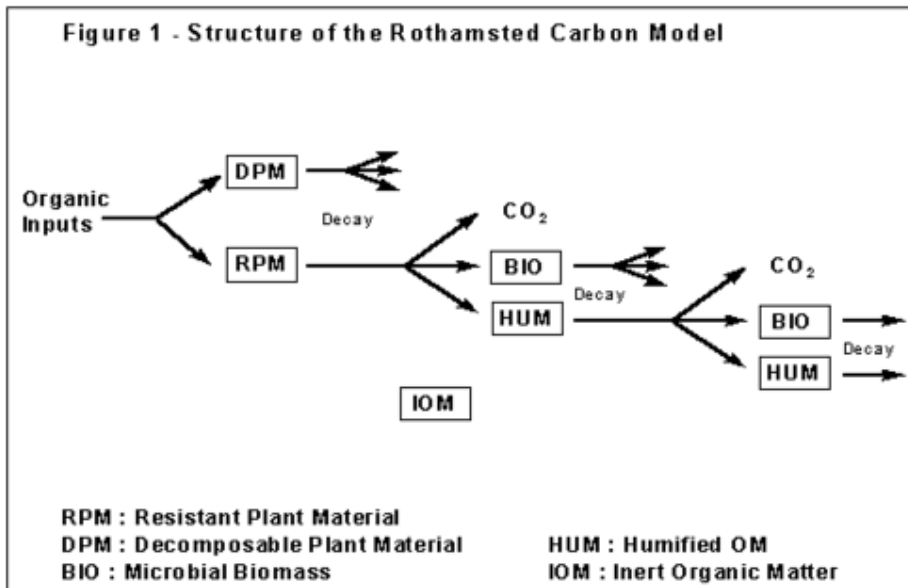*E-mail :* Coleman@bbsrc.ac.uk
Website: http://www.iacr.bbrsc.ac.uk/aen/carbon/rothc.htm

The model is freely available and can be downloaded from the website

The Rothamsted Carbon Model (RothC-26.3) allows calculating the effect of organic matter management on the development of soil organic carbon in non-waterlogged topsoils over a period ranging from a few years to a few centuries. It takes thereby into account the quality and quantity of the organic matter added, soil type, temperature, moisture content and plant cover on the turn over process.

Soil organic carbon is split into four active compartments and a small amount of inert organic matter (IOM). The four active compartments are Decomposable Plant Material (DPM), Resistant Plant Material (RPM), Microbial Biomass (BIO) and Humified Organic Matter (HUM). Each compartment decomposes by a first-order process with its own characteristic rate. The IOM compartment is resistant to decomposition.

The structure of the model is shown below.

Figure 1 - Structure of the Rothamsted Carbon Model

RPM : Resistant Plant Material
DPM : Decomposable Plant Material
BIO : Microbial Biomass

HUM : Humified OM
IOM : Inert Organic Matter

Both DPM and RPM decompose to form CO2, BIO and HUM. BIO and HUM both decompose to form more CO2, BIO and HUM.

The model uses a monthly time step to calculate total organic carbon (ton / ha), microbial biomass carbon (ton / ha) and ?14 C (from which the equivalent radiocarbon age of the soil can be calculated) on a years to centuries time scale. It needs few inputs and those it needs are easily obtainable.

The model requires the following data:

1. monthly rainfall
2. monthly evapotranspiration (mm)
3. average monthly mean temperature (oC)
4. percentage clay
5. an estimate of the decomposability of the incoming plant material - the DPM / RPM ratio
6. soil cover: is the soil bare of vegetated
7. monthly input of plant residues (ton C / ha), including C released from roots during crop growth. This can be calculated by running the model in the 'inverse' mode.
8. monthly input of farm yard manure (ton C/ha)
9. Depth of soil layer sampled (cm)

For a more information: see the manual, that can be downloaded from the website.