Revision Date: February 27, 2009

LBA-ECO ND-11 Litter Decomposition, Carbon, and Nitrogen Dynamics in Agroforestry

Summary:

This data set contains the results of an experiment to determine litter decomposition and dynamics of carbon and nitrogen release from plant litter of differing qualities which occur in combination in agroforestry systems. Reported in five ASCII files are (1) the initial values of soil and plant litter macronutrients, nitrogen; and carbon contents; (2) descriptions of the various experimental treatments; and (3) the final nitrogen and carbon composition of the plant litter and soil and calculated releases from the litter.

The study was conducted at the Empresa Brasileira de Pesquisa Agropecuaria-Centro da Pesquisa Agroflorestal (EMBRAPA-CPAA) experimental station located north of Manaus on the BR 174 highway in the central Amazon Basin. The experimental plot, located in an open grassy field, was selected based on low, homogeneous soil C and nutrient contents, minimal prior disturbance, and no previous fertilizer application. The soil was a degraded typic Hapludox with the following soil properties for the upper 0-3 cm: pH in water of 5.05, 1.3 mg N/g, 18.0 mg C/g (automatic CN Analyzer, Elementar), 2.05 mg P/kg, 55.0 mg K/kg (Mehlich-1 extractable), 11.7 mg Ca/kg, and 4.6 mg Mg/kg (KCl extractable). The experiment was conducted in the field in small plots with treatments that vary in the ratio of plant litter of two plants: gliricidia (Gliricidia sepium (Jacq.) Kunth. ex Walp.) and cupuacu (Theobroma grandiflorum). Soil and litter samples were collected prior to and during the experiment. Resin bags were used to retain mineral nitrogen released from the plant litter.

Data Citation:

Cite this data set as follows:

Schwendener, C.M., J. Lehmann, P.B. de Camargo, R.C.C. Luizao, and E.C.M. Fernandes. 2009. LBA-ECO ND-11 Litter Decomposition, Carbon, and Nitrogen Dynamics in Agroforestry. Data set. Available on-line [http://daac.ornl.gov] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. doi:10.3334/ORNLDAAC/915.

Implementation of the LBA Data and Publication Policy by Data Users:

The LBA Data and Publication Policy [http://daac.ornl.gov/LBA/lba_data_policy.html] is in effect for a period of five (5) years from the date of archiving and should be followed by data users who have obtained LBA data sets from the ORNL DAAC. Users who download LBA data in the five years after data have been archived must contact the investigators who collected the data, per provisions 6 and 7 in the Policy.

> This data set was archived in March of 2009. Users who download the data between March 2009 and February 2014 must comply with the LBA Data and Publication Policy.

Data users should use the Investigator contact information in this document to communicate with the data provider. Alternatively, the LBA Web Site [http://lba.inpa.gov.br/lba/] in Brazil will have current contact information.

Data users should use the Data Set Citation and other applicable references provided in this document to acknowledge use of the data.

Table of Contents:

1. Data Set Overview:

Project: LBA (Large-Scale Biosphere-Atmosphere Experiment in the Amazon)

Activity: LBA-ECO

LBA Science Component: Nutrient Dynamics

Team ID: ND-11 (Lehmann / Passos / Couto)

The investigators were Schwendener, Carol M.; Lehmann, Johannes; Camargo, Plínio Barbosa de; Luizao, Regina C. C. and Fernandes, Erick C.M. . You may contact Schwendener, Carol M. (cms67@cornell.edu).

LBA Data Set Inventory ID: ND11_Nitrogen_Transfer_Leaf_Litter

An experiment was conducted to determine nitrogen release from plant litter of differing qualities. This study examined decomposition and N dynamics in mixtures of high-quality leguminous mulch, gliricidia [Gliricidia sepium (Jacq.) Kunth. ex Walp.] with a C/N ratio of 13, and low-quality cupuacu [Theobroma grandiflorum (Wild. ex Spring) Schumann] litter with a C/N ratio of 42, which occur in combination in agroforestry systems. The experiment was conducted in the field in small plots with treatments that vary in the ratio of plant litter of two plants: gliricidia (Gliricidia sepium (Jacq.) Kunth. ex Walp.) and cupuacu (Theobroma grandiflorum). Soil and litter samples were collected prior to and during the experiment. Resin bags were used to retain mineral nitrogen released from the plant litter.

2. Data Characteristics:

Five comma-delimited ASCII files are provided. Values of -9999 indicate missing values. Line breaks have been added to improve readability.

File 1: file1_soil_initial.csv

Soil initial conditions. This file provides initial soil moisture, soil mineral N, soil macronutrients, pH and soil delta 15N values.

---column 1: Time (days); time since start of experiment
---column 2: Treatment; treatment name
---column 3: Treatment Code; treatment code, A = control
---column 4: Replicate; replicate number
---column 5: Number; sample number
---column 6: Depth (cm); soil sample depth
---column 7: Wet soil wt (g); soil weight, field moist
---column 8: Gravimetric water content; soil water content, w/w
---column 9: Moisture content; soil volumetric water content (w/v)
---column 10: Dry wt equiv. of 25 g moist (g); dry weight equivalent of 25g of field moist soil
---column 11: Blank NO3 (mg/L); Nitrate content of blank
---column 12: Blank NH4 (mg/L); Ammonium content of blank
---column 13: NO3 (mg/L); Soil nitrate concentration
---column 14: NH4 (mg/L); Soil ammonium concentration
---column 15: NO3 (mg/kg); Soil nitrate stock
---column 16: NH4 (mg/kg); Soil ammonium stock
---column 17: Min N (mg/kg); Soil mineral N stock (nitrate plus ammonium)
---column 18: delta 15N ; Soil 15N in delta notation
---column 19: at%15N; Soil 15N in atom percent notation
---column 20: delta 13C; Soil 13C in delta notation
---column 21: at%13C; Soil 13C in atom percent notation
---column 22: %C; Soil percent carbon
---column 23: %N; Soil percent nitrogen
---column 24: C/N; Soil carbon to nitrogen ratio

---column 25: P (mg/kg); Soil phosphorus stock
---column 26: K (mg/kg); Soil potassium stock
---column 27: Ca (mg/kg); Soil calcium stock
---column 28: Mg (mg/kg); Soil magnesium stock
---column 29: pH; Soil pH

Example Data Records

Time (days),Treatment,Treatment Code,Replicate,Number,Depth (cm),Wet soil wt (g),
Gravimetric water content,Moisture content,Dry wt equiv. of 25 g moist (g),
Blank NO3 (mg/L),Blank NH4 (mg/L),NO3(mg/L),NH4 (mg/L),NO3 (mg/kg),NH4 (mg/kg),
Min N (mg/kg),delta 15N ,at%15N,delta 13C,at%13C,%C,%N,C/N,P (mg/kg),K (mg/kg),
Ca (mg/kg),Mg (mg/kg),pH

0,control,A,1,T0-1,0-2,10,
0.1523,0.1319,21.7025,
0.025,0.105,0.17,0.445,
0.501094344,1.174979841,1.676074185,-9999,-9999,-9999,-9999,-9999,-9999,-9999,2.090,69.996,
7.3,3.6,5

0,control,A,2,T0-2,0-2,10,
0.1330,0.1174,22.065,
0.025,0.105,0.04,1.325,
0.050985724,4.146838885,4.197824609,-9999,-9999,-9999,-9999,-9999,-9999,-9999,1.710,41.998,
9.3,4.6,4.87

File 2: file2_litter_initial.csv

Litter initial conditions. This file provides initial litter macronutrients, carbon and nitrogen data.

---column 1: Time (days); time since start of experiment
---column 2: plant name
---column 3: delta 15N ; Litter 15N in delta notation
---column 4: at%15N; Litter 15N in atom percent notation
---column 5: delta 13C; Litter 13C in delta notation

---column 6: at%13C; Litter 13C in atom percent notation
---column 7: %C; Litter percent carbon
---column 8: %N; Litter percent nitrogen
---column 9: C/N; Litter carbon to nitrogen ratio
---column 10: P g/kg; Litter phosphorus concentration
---column 11: K g/kg; Litter potassium concentration
---column 12: Ca g/kg; Litter calcium concentration
---column 13: Mg g/kg; Litter magnesium concentration

Example Data Records

Time (days),plant,delta 15N ,at%15N,delta 13C,at%13C,%C,%N,C/N,P g/kg,K g/kg,Ca g/kg,Mg g/kg
0,gliricidia,58.945,0.388,-29.82,1.08,47.32,3.80,12.48,2.39,15.09,11.79,3.81
0,gliricidia,15.000,0.372,-30.02,1.08,46.69,3.29,14.20,2.03,13.15,17.34,4.16

File 3: file3_treatment_details.csv

Treatment details. This file provides carbon and macronutrient content of litter treatments.

---column 1: treatment code; treatment code is a letter given to each treatment (B - F)
---column 2: treatment; Description of treatment as percent ratio of dried gliricidia sepium leaves to cupuacu leaves
applied to each plot (G = gliricidia C = cupuacu; control = bare soil, no litter applied)
[Example: 80G 20C corresponds to treatment with litter applied as 80% gliricidia and 20% as cupuacu]
---column 3: g glir; mass of gliricidia applied
---column 4: g cup; mass of cupuacu applied
---column 5: total g; total mass applied
---column 6: N applied glir (mg); nitrogen applied as gliricidia
---column 7: N cup (mg); nitrogen applied as cupuacu
---column 8: total N applied (mg); total nitrogen applied
---column 9: ratio of N applied in G; ratio of total nitrogen applied as gliricidia
---column 10: ratio of total N applied in Cup; ratio of total nitrogen applied as cupuacu
---column 11: total glir C (g); carbon applied as gliricidia
---column 12: total cup C (g); carbon applied as cupuacu
---column 13: Total C (g); total carbon applied
---column 14: P applied (mg); total phosphorus applied
---column 15: K applied (mg); total potassium applied
---column 16: Ca applied (mg); total calcium applied
---column 17: Mg applied (mg); total magnesium applied

Example Data Records

treatment code,treatment,g glir,g cup,total g,N applied glir (mg),N cup (mg),total N applied (mg),ratio of N applied in G,ratio of total N applied in Cup,
total glir C (g),total cup C (g),Total C (g),P applied (mg),K applied (mg),Ca applied (mg),Mg applied (mg)

B,100G 0C,40.22610349,0,40.22610349,1413.947538,0,1413.947538,100,0,
18.90291646,0,18.90291646,88.5446263,568.7971033,598.5644199,158.3567607

C,80G
20C,32.18088279,9.3040625,41.48494529,1131.15803,115.370375,1246.528405,90.74466538,9.255334618,
15.12233317,4.790661781,19.91299495,78.78993015,475.5531405,565.7049593,146.5961023
...

File 4: file4_15N_soil.csv

Soil 15N. This file provides data on soil nitrogen and carbon, including 15N and 13C, during experiment.

----Column 1: Days after litter treatments were initially applied to soil at which time sample was taken
----Column 2: Treatment code is a letter given to each treatment (B - F)
----Column 3: Description of treatment as percent ratio of dried gliricidia sepium leaves to cupuacu leaves
applied to each plot (G = gliricidia C = cupuacu; control = bare soil, no litter applied)
[Example: 80G 20C corresponds to treatment with litter applied as 80% gliricidia and 20% as cupuacu]
----Column 4: Replicate number
----Column 5: Sampling depth in centimeters
----Column 6: Wet soil dry weight in grams
----Column 7: Soil dry weight in grams after 24 hours of drying in oven
----Column 8: Soil moisture content by gravimetric method (w/w)
----Column 9: Volumetric soil moisture content (v/v)
----Column 10: Nitrate content in milligrams per liter of the blank
----Column 11: Ammonia content in milligrams per liter of the blank
----Column 12: Nitrate content in milligrams per liter of soil extracted sample
----Column 13: Ammonia content in milligrams per liter of soil extracted sample
----Column 14: Nitrate content in milligrams per kilogram soil
----Column 15: Ammonia content in milligrams per kilogram soil

----Column 16: Total mineral nitrogen content in milligrams per kilogram soil
----Column 17: N mineralized since start of experiment (mg/kg)
----Column 18: Mineral N as a percent of the nitrogen applied in the litter
----Column 19: Nitrate content in resin not placed in soil
----Column 20: Ammonia content in resin not placed in soil
----Column 21: Nitrate content in resin with blank subtracted in milligrams nitrate per liter extract
----Column 22: Ammonia content in resin with blank subtracted in milligrams ammonia per liter extract
----Column 23: Mineral nitrogen content in resin in milligrams nitrogen per liter extract
----Column 24: Difference in mineral nitrogen extracted from resin during first and second sampling
----Column 25: Mineral nitrogen extracted from resin divided by number of days between sampling
----Column 26: Delta 15N in soil
----Column 27: Delta 13C in soil
----Column 28: Percent carbon in soil
----Column 29: Percent nitrogen in soil
----Column 30: Grams nitrogen in soil per kilogram soil
----Column 31: Carbon to nitrogen ratio in soil

Example Data Records

Time (days),Treatment Code,Treatment,Replicate,Depth (cm),Wet soil wt (g),Dry soil wt (g),Gravimetric water content,Moisture content by weight,
Blank NO3 (mg/L),Blank NH4 (mg/L),NO3 (mg/L),NH4 (mg/L),NO3 (mg/kg),NH4 (mg/kg),Min N (mg/kg),N mineralized since start (mg/kg),
Min N as % of N applied,Resin Blank NO3 (mg/L),Resin Blank NH4 (mg/L),Resin NO3 (mg/L),Resin NH4 (mg/L),Resin NH4+NO3 (mg/L),
NH4+NO3 leached between times,Relative leaching per day,delta 15N soil,delta 13C,%C,%N,N (g/kg),C/N

6,A,control,1,0-3,10,8.929,0.1199,0.1071,
0,0.105,0.09,0.69,0.302385485,1.965505656,2.267891141,-0.591802442,
-9999,0,0.145,0.29,0.145,0.435,
0.435,0.0725,6.5,-23.73,1.25,0.09,0.9,13.89
...

96,F,0G 100C,4,-9999,10,9.166,0.091,0.0834,
0.0115,0.2075,1.1805,3.1545,3.826096443,9.645428758,13.4715252,10.61183162,
2.33535259,0.0115,0.2075,8.9085,31.2025,40.111,
37.636,0.648896552,6.32,,1.74,0.12,1.2,14.5

File 5: file5_15N_litter.csv

Litter 15N. This file provides nitrogen and carbon, including 15N and 13C, data released from litter at discrete time intervals during experiment.

----Column 1: Days after litter treatments were initially applied to soil at which time sample was taken
----Column 2: Treatment code is a letter given to each treatment (B - F)
----Column 3: Description of treatment as percent ratio of dried gliricidia sepium leaves to cupuacu leaves
applied to each plot (G = gliricidia C = cupuacu; control = bare soil, no litter applied)
[Example: 80G 20C corresponds to treatment with litter applied as 80% gliricidia and 20% as cupuacu]
----Column 4: Replicate number for each treatment
----Column 5: Dry weight of cupuacu leaves in grams
----Column 6: Dry weight of gliricidia leaves in grams
----Column 7: Percent of the original cupuacu weight applied that remains at sampling time
----Column 8: Percent of the original gliricidia weight applied that remains at sampling time
----Column 9: Total initial litter weight applied to plot in grams
----Column 10: Total litter weight remaining at time of sampling in grams
----Column 11: Percent litter weight remaining
----Column 12: Percent litter decomposed or 100%
----Column 13: Percent of litter applied composed of cupuacu leaves
----Column 14: Percent of litter applied composed of gliricidia leaves
----Column 15: Percent of litter remaining composed of cupuacu leaves
----Column 16: Percent of litter remaining composed of gliricidia leaves
----Column 17: Estimated milligrams of nitrogen applied in cupuacu leaves (calculated based on initial nitrogen
content of leaves times the total grams of cupuacu leaves applied)
----Column 18: Estimated milligrams of nitrogen applied in gliricidia leaves (calculated based on initial
nitrogen content of leaves times the total grams of gliricidia leaves applied)
----Column 19: Estimated milligrams of total nitrogen applied
----Column 20: Delta 15N in gliricidia leaves
----Column 21: Difference in Column T and initial delta 15N for gliricidia
----Column 22: Percent of gliricidia dry weight composed of carbon
----Column 23: Percent of initial carbon dry weight remaining in gliricidia leaves
----Column 24: Percent of gliricidia dry weight composed of nitrogen
----Column 25: Carbon to nitrogen ratio for gliricidia leaves
----Column 26: Carbon to phosphorus ratio for gliricidia leaves
----Column 27: Delta 15N in cupuacu leaves

----Column 28: Change in delta 15N for cupuacu leaves from start of experiment
----Column 29: Percent of cupuacu dry weight composed of carbon
----Column 30: Percent of initial carbon dry weight remaining in cupuacu leaves
----Column 31: Percent of cupuacu dry weight composed of nitrogen
----Column 32: Carbon to nitrogen ratio in cupuacu leaves
----Column 33: Carbon to phosphorus ratio in cupuacu leaves
----Column 34: Grams of cupuacu-carbon remaining in sample
----Column 35: Grams of gliricidia-carbon remaining in sample
----Column 36: percent of the initial cupuacu-carbon content remaining
----Column 37: percent of the initial gliricidia carbon content remaining
----Column 38: Total carbon remaining expressed as percent of original carbon in sample
----Column 39: Grams of cupuacu-nitrogen remaining in sample
----Column 40: Grams of gliricidia-nitrogen remaining in sample
----Column 41: Total grams of nitrogen remaining in litter sample
----Column 42: Difference in grams of cupuacu-nitrogen in sample and initial cupuacu-nitrogen in sample
----Column 43: Difference in grams of gliricidia-nitrogen in sample and initial gliricidia-nitrogen in sample
----Column 44: total N released from litter, in grams
----Column 45: total N remaining in litter, as percent
----Column 46: percentage of initial total nitrogen released from litter
----Column 47: Percent of the gliricidia-nitrogen remaining
----Column 48: Percent of gliricidia-nitrogen released
----Column 49: Percent of cupuacu-nitrogen remaining
----Column 50: Percent of cupuacu-nitrogen released

Example Data Records

Time (days),Treatment Code,Treatment,Replicate,Cupuaçu dry wt (g),Gliricidia dry wt (g),% cup remaining ,% glir remaining,Total initial litter wt (g),
Total litter remaining (g),Total litter remaining (%),Litter % decomposed,% of total as cup,% of total as glir,% of total % remaining as cup,
% of total % remaining as glir,Est N applied in cupuacu (mg),Est N applied in gliricidia (mg),Est N applied (mg),delta 15N glir,change in delta 15N glir,
%C glir,% of original C remaining glir,%N glir,C/N glir,C/P glir,delta 15N cup,change in delta 15N from T0 cup,%C cup,% of original C remaining cup,
%N cup,C/N cup,C/P cup,cup g C remaining,glir g C remaining,% carbon in cup remaining,% carbon in glir remaining,Total %C remaining,
cup g N remaining,glir g N remaining,Total N in litter remaining (g),cup g N released,glir g N released,total litter g N released,Total N rem % litter,
Total N released from litter since T0 (%),N rem % glir,N released from glir (%),N rem cup %,N released from cup (%)

6,B,100G 0C,1,0,36.9,0,90.4982707,40.77425979,
36.9,90.4982707,9.501729299,0,100,0,
90.4982707,0,1413.947538,1413.947538,31.690,-2.078,
45.40,0.89,3.62,12.54,183.34,0,0,0,0,
0,0,0,0,16.7526,0,88.62441958,88.62441958,
0,1.33578,1.33578,0,0.078167538,0.078167538,94.47168049,
5.528319509,94.47168049,5.528319509,-9999,0
...
96,F,0G 100C,4,43.0,0,91.92944949,0,46.775,
43,91.92944949,8.070550508,100,0,91.92944949,
0,576.851875,0,576.851875,0.00,-9999,
-9999,-9999,-9999,-9999,-9999,2.76,0.135,44.96,0.807103523,
1.43,31.44,576.4102564,19.3328,0,80.71035228,0,80.71035228,
0.6149,0,0.6149,-0.038048125,0,-0.038048125,106.5958224,
-6.595822368,-9999,0,106.5958224,-6.595822368

Site boundaries: (All latitude and longitude given in degrees and fractions)

Site (Region)	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude	Geodetic Datum
Amazonas (Manaus) - EMBRAPA DAS Experiment - km 54 (CPAA) (Amazonas (Manaus))	-60.03000	-60.03000	-2.51800	-2.51800	World Geodetic System, 1984 (WGS-84)

Time period:

- The data set covers the period 2002/07/11 to 2002/10/15.
- Temporal Resolution: Daily

Platform/Sensor/Parameters measured include:

- LABORATORY / SPECTROPHOTOMETER / NITROGEN
- LABORATORY / SPECTROPHOTOMETER / CARBON
- LABORATORY / CHN ANALYZER / CARBON
- LABORATORY / MASS SPECTROMETER / NITROGEN

3. Data Application and Derivation:

Data sets contain laboratory results from litter dynamics from experimental treatments in small plots (0.25m x 0.25m) conducted in field study.

It has been proposed that the C/N ratio, or quality, of litter or mulch mixtures affects N release. Although total N release from these mixtures and the effects on soil N are relatively well understood, a mechanistic understanding of the interactions between litter species with respect to their N release is still lacking. This study examined decomposition and N dynamics in mixtures of high-quality leguminous mulch, gliricidia [Gliricidia sepium (Jacq.) Kunth. ex Walp.] with a C/N ratio of 13, and low-quality cupuacu [Theobroma grandiflorum (Wild. ex Spring) Schumann] litter with a C/N ratio of 42, which occur in combination in agroforestry systems. Ratios of 100:0, 80:20, 50:50, 20:80, 0:100 of fresh 15N-enriched gliricidia leaves and senescent cupuacu leaves, totaling the same dry weight of 6.64 t ha-1, were applied to an Oxisol and sampled at 6, 14, 38, and 96 days after application. After more than 40% of the N in the gliricidia leaves had been released and the microbial biomass N reached its peak, a significant increase in available soil N occurred at day 14, which was more pronounced with greater amounts of gliricidia in the leaf mixture. However, relative to the N applied in the leaf mixture, there was no significant difference in available soil N with greater proportions of gliricidia. Total N release from the mixtures corresponded to the total N applied by gliricidia. Until day 38, cupuacu C mineralization was significantly faster in the presence of the highest proportion of gliricidia compared to lower proportions. This faster C mineralization of more than 0.5% per day, however, did not increase total C loss or N release from cupuacu leaves after 96 days. The use of 15N tracers identified an N transfer from gliricidia leaves and the soil to cupuacu leaves and consequently, a lower N release from gliricidia to the soil in the presence of cupuacu leaves. Though we expected that available N in the soil would also decrease with greater amounts of cupuacu litter in the mixture, our results indicated an additive effect of the two species on N release and soil mineral N, with gross interactions between them canceling net interactive effects. Therefore, N release of leaf mixtures behaved as predicted from a calculated sum of individual release patterns, in spite of a transfer of N from the high- to the low-quality leaves.

4. Quality Assessment:

No known problems with data.

5. Data Acquisition Materials and Methods:

The study was conducted at the Empresa Brasileira de Pesquisa Agropecuaria—Centro da Pesquisa Agroflorestal (EMBRAPA-CPAA) experimental station located north of Manaus on the BR 174 highway in the central Amazon Basin (Schwendener et al., 2005). The experimental plot, located in an open grassy field, was selected based on low, homogenous

soil C and nutrient contents, minimal prior disturbance, and no previous fertilizer application. The soil was a degraded typic Hapludox with the following soil properties for the upper 0–3 cm: pH in water of 5.05, 1.3 mg N/g, 18.0 mg C/g (automatic CN Analyzer, Elementar), 2.05 mg P/kg, 55.0 mg K/kg (Mehlich-1 extractable), 11.7 mg Ca/kg, and 4.6 mg Mg/kg (KCl extractable). The experiment was conducted in the field in small plots with treatments that varies in the ratio of plant litter of two plants: gliricidia (Gliricidia sepium (Jacq.) Kunth. ex Walp.) and cupuacu (Theobroma grandiflorum). Soil and litter samples were collected prior to and during the experiment. Resin bags were used to retain mineral nitrogen released from the plant litter.

Twenty-five gram fresh soil samples and the resin bags were extracted with 75 ml of 1 M KCl for 30 min and 1 h, respectively, on a horizontal shaker at 305 rpm. Samples were left overnight to decant and the supernatant was pipetted and analyzed for NHC4 and NO3 on a continuous flow analyzer (Scan Plus Analyzer, Skalar Analytical B.V., Breda, The Netherlands). After oven drying, plant and soil samples were ground with a ball mill to 250 mm. Soil and plant C and N contents and d15N values were determined by combustion in a CN analyzer (Carlo-Erba model 1110) connected to an isotope mass spectrometer (Thermo Finnigan, San Jose, CA, USA).

6. Data Access:

This data is available through the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

Contact for Data Center Access Information:

E-mail: uso@daac.ornl.gov
Telephone: +1 (865) 241-3952

7. References:

Schwendener, Carol M., Johannes Lehmann, Plinio B. de Camargo, Regina C.C. Luizao and Erick C.M. Fernandes (2005). Nitrogen transfer between high- and low-quality leaves on a nutrient-poor Oxisol determined by 15N enrichment. Soil Biology and Biochemistry, 37: 787-794.