Getting train to manage biowastes: The e-learning curriculum "Agronomic and environmental impacts of organic residues recycling in agriculture. Application to The South"

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Abstract
The Open and Distance Learning (ODL) curriculum "Agronomic and environmental impacts of organic residues recycling in agriculture. Application to The South " provides students with a comprehensive approach promoting organic matter recycling, as to know the assets and environmental risks, and to gain capacities on the measurement and analytical methods at field and laboratory levels according to the specificities of The South (especially dry tropical climate), whatever the logistical, environmental or regulatory constraints. This curriculum is a part of the ODL resources of the Virtual University Environment and Sustainable Development (UVED). This curriculum consists of 7 courses of different sizes. It is open to French-speaking professionals and Master level students, in the area of agricultural development, agribusiness and environmental engineering seeking to boost their career/training.

Introduction
"Organic resources consist of biowastes (i.e. organic residues) from agriculture (manure, slurry, straw, etc.), agro-industries (vinasses, abattoir wastes, etc.) and municipalities (sewage sludge, household wastes, etc.). In The South, these biowastes are often the main input of agricultural production systems. Integrated management of these resources targets a more sustainable agricultural production through the consideration of environmental, economic and social aspects. *Everybody knows something about waste but nobody knows everything"* [1].
The Open and Distance Learning (ODL) curriculum "Agronomic and environmental impacts of organic residues recycling in agriculture. Application to The South [2]" provides learners with a comprehensive approach promoting organic matter recycling, as to know the assets and environmental risks, and to gain capacities on the measurement and analytical methods at field and laboratory levels according to the specificities of The South (especially dry tropical climate), whatever the logistical, environmental or regulatory constraints. It was designed by a group of experts from CIRAD and INRA (France), University Cheikh Anta Diop (Senegal) and Institut d'Economie Rurale (Mali). This curriculum is a part of the ODL resources of the Virtual University Environment and Sustainable Development (UVED) [3] which is supported by the French Ministry of Higher Education and Research. This curriculum was validated through a peer-review process on scientific and instructional aspects. It was also tested in its full configuration at University Cheikh Anta Diop and à la carte in two tropical outermost regions of France and in Cameroon.

Learning objectives
Graduate practitioners must be able to:
- Master the basic principles of organic management of cultivated soil fertility and recycling in agriculture of all types of organic matter (i.e. "know to")
- Apply the methods of measurement and analysis tailored to a poor-technical environment
- Promote an adaptive management of organic matter
- Design and lead projects to promote sustainable organic resource management with agricultural stakeholders and decision makers (farmers, extension services, etc.).
- Raise awareness of and train various audiences on good agricultural practices and environmental protection (i.e. "know how to")
- Develop observation, diagnosis, analysis and synthesis, and consulting abilities as well as leadership and team working capacities (i.e. "know how to be", interpersonal skills).

Instructional scenario

A modular organisation

The curriculum consists of seven courses aimed at achieving two main goals (Figure 1):

1. Defining the agronomic potential of organic materials
2. Environmental assessment related to the management of these organic materials.

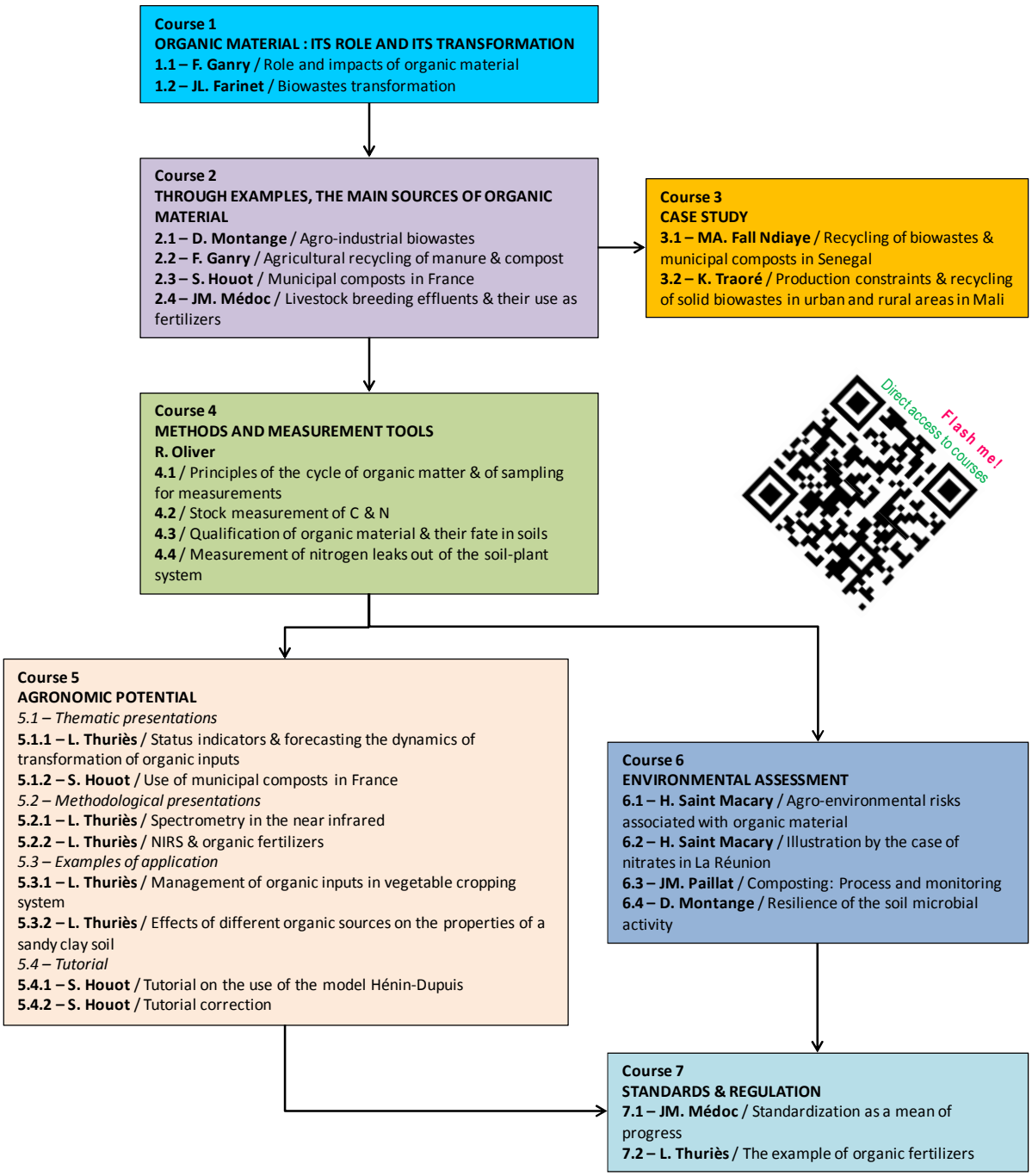

Figure 1. Courses tree diagram

Each course is designed to achieve specific learning objectives and consists of a collection of recorded conferences (or lessons) in Flash format and timed MCQs for self-evaluation, accessible in HTML format (table 1).

Courses 1, 2, 4 are the core courses. Then, three possibilities:

1. Core courses plus courses 5, 6 and 7 (recommended configuration)
2. Core courses plus courses 5 and 7 for learners with an "agronomic" purpose
3. Core courses plus courses 6 and 7 for learners with an "environmental" purpose.

The course 3 consists of two case studies whose aim is to provide the learner with technical, political and economic information relating to real situations of organic material management and to allow him to define the subject of his final exercise and benefit support in carrying out this exercise.

Table 1. Total time for lessons, completion of MCQs and introduction of case studies/tutorial

	Lessons	**MCQs timed**	**Case study/Tutorial**
Number	22	7	2/1
Total time (minutes)	672	90	40

The possible forms of education

This module is intended to be carried out in three main forms of education:

1. Group and *"a la carte"* learning, presence of learners in one place over a given period, led by a tutor.
2. Distance learning, the learners benefit from a full open and distance training accompanied by a tutor depending the lesson and the individual needs. Moreover, they should be gathered at least once in a given location (e.g. at the kick-off of the training) and also by planned videoconference meetings;
3. Enriched in-presence learning (in addition to a curriculum already in place), this regular training form is designed for learners (students) enrolled in Master curriculums and School of engineering (agronomy, veterinary, polytechnics, etc.).

Tutor training

The tutor's role is crucial in the success of the training. A tutor training is recommended. CIRAD can be a platform for it and it could take two forms:

1. An interview with the person in charge of the curriculum
2. A one-day workshop with the authors or selected authors.

Modalities are to be defined with CIRAD.

Knowledge assessment

The knowledge assessment occurs during training while completing the timed MCQs (self-evaluation of the learner's understanding), participating to the debates with the tutor or with the group during videoconference meetings and performing the tutorial. A final exercise must be done individually or in group starting from the case studies included or adapted to the geographical location where the course is offered.

Accessibility

This resource itself is free-access. It is not linked to an existing European or French curriculum. Since the beginning of the academic year 2013, it is linked to a Master curriculum provided at the University Cheikh Anta Diop of Dakar. The learner must have a computer with sound and access to a high speed internet connexion.

Enrollment

As an interdisciplinary program, this ODL curriculum is open to French-speaking (for the moment) professionals and Master level students, in the area of agricultural development, agribusiness and environmental engineering, seeking to boost their career/training.

References

[1] LeBlanc RJ, Matthews P, Richard RP (eds), 2009. Global atlas of excreta, wastewater sludge, and biosolids management: moving forward the sustainable and welcome uses of a global resource. Greater Moncton Sewerage Commission, UN Habitat. 608 p.
[2] http://uved-matorg.cirad.fr/
[3] http://www.uved.fr/