



world congress on integrated  
**crop-livestock-forest systems**

3<sup>rd</sup> International  
Symposium on Integrated  
Crop-Livestock Systems

**towards sustainable intensification**  
brasilia • brazil • 2015

# Congress Proceedings

**Anais do Congresso**

**T**hese Proceedings organize the papers and abstracts presented at the 2015 World Congress on Integrated Crop-livestock-forest systems (WCCLF) incorporating the Third International Symposium on Integrated Crop-Livestock Systems, held from July 12 to 17, 2015, at the Ulysses Guimarães Convention Center in Brasília, DF.

The objective of the Congress was to discuss the state-of-the-art of integrated agricultural systems as well as its perspectives as main 'drivers' of sustainable intensification on agriculture all over the world. The event was organized and promoted by the Brazilian Agricultural Research Corporation and the Federal University of Rio Grande do Sul, with the support of many national and international institutions including CIAT, CIRAD and USDA.

The event was based on three pillars. Plenary presentations of international scientific results on ICLF systems; technical training of technicians with focus on existing recommendations; and teaching conferences to discuss inclusion of the ICLF in the Universities agendas.

Scientists, experts, technicians, professors, students and leading producers of different fields participated in the Congress, which was organized into three main topics: technology, environment and social economy. The subjects distributed in many topics in the agenda include issues related to global agriculture sustainability; opportunities and limitations on the adoption of integrated systems; environmental costs of intensive agriculture; contributions of integration for family farming; efficient use of water and nutrients; carbon sequestration and greenhouse gas emissions, among others.

More than 350 scientific papers were selected for presentation. Forty of these scientific submissions were chosen for oral presentation, arranged in ten parallel sessions. The other submissions were presented in poster format, and remained displayed in the panels during the entire event. This present publication is divided in three sessions: Abstracts of plenary speakers, Abstracts of Oral Presentations in parallel sessions and Posters' Abstracts.

## RESULTS

The program of the Congress, both technical and scientific, was substantial and produced significant statistics. A total of 24 scientists participated in the Plenary Session, from several different countries including five from Brazil. The two Special Sessions, for technicians and for teaching, had 23 presentations. A total of 907 attendees were pre-registered and 602 were present at the event. Twenty six Brazilian states were represented as well as 22 countries. Two hundred and twenty eight public and private institutions were represented by different attendees. Three hundred and fifty four submitted papers were presented either as posters or as oral presentations. The total of 1,075 co-authors contributed with scientific papers submitted. An intensive debate was encouraged in the teaching Special Sessions in order to discuss the inclusion ICLF systems courses in the universities and technical schools. Professors, students and technicians appointed limitations in the curricular plans and course programs. They proposed alternatives, new procedures and recommendations to improve ICLF disciplines, considering the complexity of the systems and the need of a systemic multidisciplinary approach of this subject

## Bulk density in different CLF systems after three years of establishment

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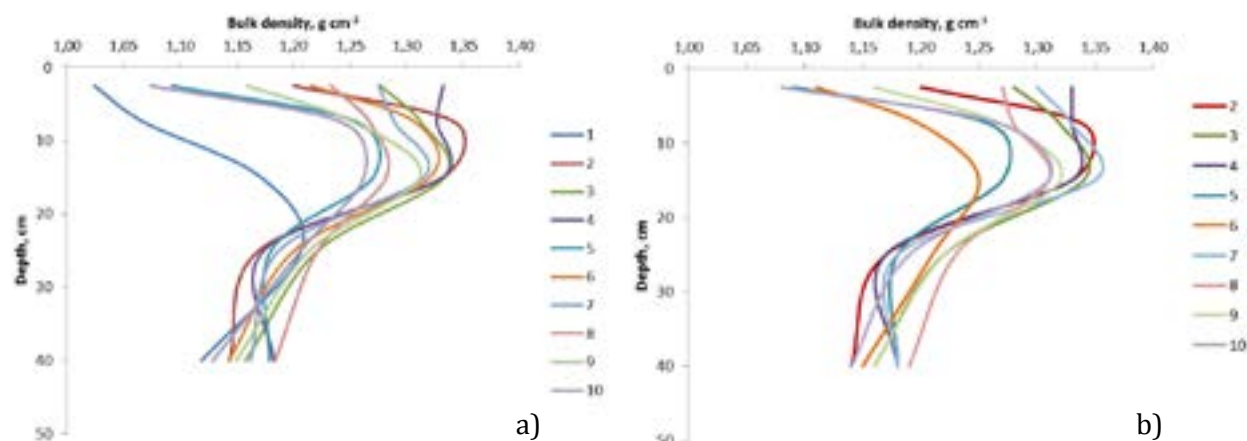
**Introduction** Integrated crop-livestock-forest systems can affect soil attributes in different ways. In this regard, one important attribute that needs to be taking into account is bulk density (BD). Higher values of BD cause decrease on water infiltration rates and soil volume explored by the roots, resulting in soil erosion, and loss of crop yield. This work presents results of determinations BD measures from 10 different integrated production systems after three years of establishment.

### Material and Methods

The experiment was established in a randomized block design with four replications. The production systems evaluated were: 1-Forest with eucalyptus; 2-Crop no till system with soybean crop followed by corn intercropped with *Brachiaria brizantha*; 3-Livestock with *Brachiaria brizantha*; 4-Crop-Livestock (2 years each); 5-Livestock-Crop (2 years each); 6-Livestock-Forest; 7-Livestock-Forest; 8-Crop-Livestock (2 years each)-Forest; 9-Livestock-Crop (2 years each) - Forest; 10-Crop+ Livestock-Forest. It was collected rings volumetric (100 cm<sup>3</sup>) in the 0-5; 5-10; 10-20; 20-30 and 30-50 cm of soil layer. The soil samples were placed in a drying oven (105 ° C) and the BD determined.

### Results and Conclusions

Fig. 1. Bulk density in the CLF systems after three years of establishment, a) general average; b) means of crop and pasture areas only.




Treatments 1, 5, 9 and 10 showed lower BD in the 0-5 cm layer (Fig. 1a). In the 5-10 and 10-20 cm layers, treatment 1 showed lower value, and in the other layers there were no significant differences after three years of implementation. If we consider only samples from crop and pasture areas, soils under pastures had higher BD values than those under crop systems in the 0-5 cm layer. (Fig. 1b). To this is attributed to sowing operation amending the soil surface layer. Therefore, after three years of establishment, bulk density was little affected by different CLF systems.

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# How does integrating cropping-livestock-forest systems influence sustainability issues?




 **Ciro Augusto de Souza Magalhães**

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