Integrated crop-livestock-forestry systems: a Brazilian experience for sustainable farming

Davi José Bungenstab¹, Roberto Giolo de Alemeida¹ and Horst Jürgen Schwartz²

¹Embrapa Gado da Corte, Brazil; ²Humboldt-Universität zu Berlin, Albrecht-Thaer-Institute for Agricultural Sciences, Germany

**Background**
- Agroforestry, silvo-pastoralism, and agro-silvo-pastoralism are means to increase food production while simultaneously providing valuable ecosystem services.
- Such systems halt and revert widespread land degradation, improve and diversify the range of farm products, and safeguard biodiversity.
- Brazil has pioneered some important agricultural technologies in the world, as the no-tillage system, which allows two harvests a year in many parts of the country.

**Objective**
- Intending to contribute information regarding such integrated systems, a publication was produced by the Brazilian Agricultural Research Corporation – Embrapa.
- Titled "Integrated Crop-Livestock-Forestry Systems" it is a richly illustrated, 282 page book, with 20 chapters involving many scientists from different institutions, approaching the major themes related to the subject, addressing technologies available and their potential for further improvement and expansion.

**Overview**
- Concepts and initiatives for sustainable agriculture
- Integrated Systems: Advantages and limitations
- Crop-livestock-forestry integration and progress in Brazilian agriculture
- ICLF systems and innovation in Brazilian agriculture
- Entrepreneurship for sustainability with ICLF
- Integrated crop-livestock systems to recover degraded pastures
- Fundamentals of ICLF systems with Eucalyptus trees
- Planning tools for crop-livestock-forestry integration
- Forage grasses in integrated cattle production systems
- Tree species in integrated production systems

**Content Samples**

**Economic advantages of ICLF**
- Increase in total yield per unit area
- More efficient use of labour
- Reducing per unit costs of outputs
- Increased profits as result of higher yields and lower profits
- Better distribution and diversification of revenue throughout the year, generating a more balanced cash flow
- Risk mitigation in production and prices due to diversification

**Establishment of an ICLF system**

**Cultivation scheme of an ICLF System**

**Effects on soils**

**A fully functional system**

**Effect on microclimate**

**Distribution of aggregates in the 0-5 cm deep layer, grouped into three size classes for crop systems under conventional preparation (C-CP); crop under no-till system (C-DS); soybean rotation for 1 year - pasture (B. brizantha) for 3 years (S1P3); permanent pasture (B. decumbens) (PP). Source: Salton, 2005.**

**Soybeans crop in an ICLF system under implementation, with newly planted eucalyptus in single rows.**

**Nellore cattle grazing in a shaded area in an integrated Crop-Livestock-Forestry system. Photo: D. J. Bungenstab.**

**Effect of tree density on micro-climate (Globe Temperature and Humidity Index) in different ICLF systems: ILPFF-1, with 357 eucalyptus trees/ha; ILPFF-2, with 227 eucalyptus trees/ha; ILP, with five remaining native trees/ha from 7:00 a.m. to 5:00 p.m. in Campo Grande. Source: Adapted from Oliveira et al. (2012c).**

---

¹Contact address: Asternplatz 2a, 12203 Berlin, Germany • schwartzjh@gmail.com