les dossiers
d'AGROPOLIS INTERNATIONAL

Expertise of the scientific community

Agronomy
Crops and cropping systems

Number 12

Overall, the unit aims to develop knowledge and tools that will ultimately help farmers streamline their production systems on the basis of combined sustainability criteria:
- agronomic (technical-economic optimization of production)
- socioeconomic (economic profitability and social acceptability)
- environmental (ecological impacts and services).

The unit carries out its targeted research activities in partnership with public and private sectors. Research is undertaken in collaboration with research units of CIRAD, INRA and IRD, universities, national agricultural research structures partner developing countries and private partners (farmers' groups, agroindustrial groups).

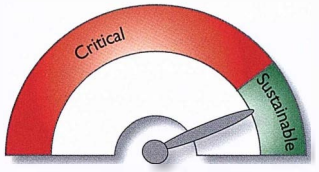
Engineering and expertise operations are also conducted to meet the demands of private and institutional operators, thus generating substantial autonomous resources for the unit and CIRAD. These expertise-consulting activities account for around seven senior scientist full-time equivalents a year.

The unit plans to continue its activities in the coming years, while focusing its project on two main lines of research:
- Line 1: Agroeconomic performances of technical production systems
- Line 2: Environmental and social performances of technical production systems. •••

Environmental impact indicators in oil palm plantations

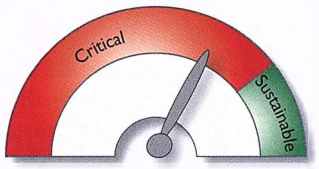
It is essential to understand and measure the environmental impacts of agricultural production in order to optimize cropping systems and thus ensure sustainable production. This is becoming a crucial issue with respect to oil palm cropping. The growing global demand for oil palm is rapidly increasing pressure on natural resources. Since 2004, CIRAD has been developing agroenvironmental indicators to help growers reduce their environmental impact by modifying their cropping practices. Indicators of the INDIGO® method have been adapted for oil palm. These indicators were designed through the modelling of emissions and potential impacts, and validated by comparison with field data. A scoring system, developed on the basis of scientific knowledge and field expertise, is used to classify practices on a scale of 0 (high environmental risk, change practices) to 10 (optimal situation, no risk), with 7 being set as the sustainability threshold.

These classification systems, which are already operational for the first four indicators (nitrogen, fertilization, pest and disease control, organic matter and soil cover), were pooled for calculation in a database with a user-friendly graphic interface, i.e. the Ipalm software package. Growers who adopt Ipalm can already obtain an environmental assessment of their plantation and determine how to improve their cropping practices via simulations. Upstream research is under way on the functioning of agroecosystems to enhance the development of new indicators and validate them under different conditions (climate, soils, agricultural practices, etc.). The team is also focusing specifically on the production of indicators of the impact of practices on biodiversity and water quality by broadening its environmental assessment approach to the landscape scale. In the longer term, socioeconomic impact indicators will potentially be integrated to address the many sustainability issues.



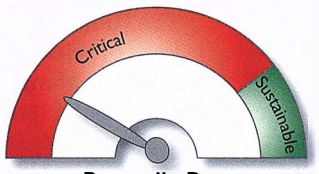
Mineral soil - Iphy-palm

Recommendation:
Practice already globally sustainable



Peat soil - Iphy-palm

Recommendation:
Practice globally NOT sustainable



Peat soil - Rsur

Recommendations:
- Practice induces an extremely high contamination risk on surface water
- Avoid spraying close to drains

▲ *Example of Iphy-palm ('pest and disease control' indicator of the Ipalm method) indicator results.*

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▶ *Landscape and land use.*