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Agronomy
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DMC—an ecological intensification engineering tool

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For ecological intensification, research must provide relevant solutions to two major issues, i.e. need to produce more even though farmland is decreasing, and to produce better in order to preserve the environment. The intensification of natural processes by direct seeding mulch-based cropping systems (DMC) can restore the chemical, physical and biological fertility of the soil, while enhancing expression of genetic potentials to ensure high pest and disease resistance and high productivity.

Studies on these processes and their management provide the foundations of engineering applied to ecological intensification. This involves implementing all DMC diagnostic, development, assessment and management methods to address major issues concerning development in tropical countries. UPR SCV, through its diversified partnership network, is implementing DMC principles and promoting the reintroduction of functional biodiversity, through studies on:

- rehabilitation of degraded tropical soils
- ecological intensification of rainfed food and cash cropping systems, flooded rice cultivation under poor water management, and tree-crop based systems
- development of biological tools to support environment-friendly system functions, such as soil detoxification, pest control, carbon sequestration and the development of DMCs that meet organic agriculture specifications.

These new cultivated ecosystems are valuable for both humans and the biosphere. The engineering approach is based on systems research, which enhances thematic research and in turn integrates thematic research advances. This approach favours biological modelling, which recreates—*in situ* and *in vivo*—all interactions and interfaces required for the intensification of natural processes so as to better understand, control and manage them.

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▲ *Rice cropped on* Stylosantes guianensis *mulch (Xieng Khouang province, Laos).*