

LOW Input Farming Systems :

An Umbrella concept for Sustainable Agriculture in Europe



A new model for European agriculture

Sustainable agriculture means farming systems which are ecologically sound, economically viable and socially just. These characteristics should ideally be applied to all aspects of a farming system – production and marketing. This way of farming is a challenge for Europe in the context of decreasing agricultural area and competition for land due to increased interest in bioenergy crops. The respect of the European agri-environment (cross-compliance, « Nitrates » Directive, Water Framework Directive, European Soil Strategy, Birds Directive and Habitats Directive, Biodiversity Action Plan for Agriculture) requires a better use of resources and a significant reduction of agricultural inputs. The Biodiversity Action Plan for Agriculture has *inter alia* the objective: « To promote and support organic and low-intensive agricultural systems » (COM(2001) 162 final).

Definition

"Low Input Farming Systems (LIFS) seek to optimise the management and use of internal production inputs (i.e., on-farm resources) ... and to minimise the use of production inputs (i.e., off-farm resources), such as purchased fertilisers and pesticides, wherever and whenever feasible and practicable, to lower production costs, to avoid pollution of surface and groundwater, to reduce pesticide residues in food, to reduce a farmer's overall risk, and to increase both short- and long- term farm profitability" (Parr et al. 1990).

Low inputs and high efficiency

LIFS try to minimize off-farm inputs and look for the highest efficiency of on-farm resources.



A Technical Approach of LIFS : the Main Success Factors

The concept of LIFS covers many production systems (organic, integrated, conservation agriculture ...). However, there is one constant: LIFS are seeking optimisation of on-farm resources, minimisation of off-farm resources. This translates into having a more 'closed' production cycle (and, consequently, less external inputs) and requires more advanced agronomic skills. It also leads to mixed farming system.

Mixed crop-livestock farming : taking advantage of local resources and natural regulation processes

In agriculture, mixed crop-livestock farming refers to the diversified management and simultaneous control of several species (livestock and crops) and several land areas. It is characterised by animal

valorisation of vegetal production on farm and organic manure restitution to farm soil from farm husbandry.

Mixed farming is considered optimum when a farm combines : diversified crops with a long rotation, livestock, natural elements.

crop rotation : a key issue for LIFS

A long rotation is a way to :

- control pests and weeds
- reduce reliance on synthetic chemicals

- prevent soil-borne diseases
- maintain soil fertility and reduce soil erosion
- reduce off-farm inputs.

Soil conservation agriculture

Conservation agriculture is a way to increase soil fertility, reduce soil erosion, increase organic matter and improve water buffer capacity. Conservation agriculture refers to several practices which permit management of the soil. Crop residues are left in place as soil cover instead

of ploughing them into the ground. Special equipment must be used the next cropping season to drill seeds directly into the soil without ploughing the field. The surface cover inhibits the germination of weeds, protects soil microorganisms and builds up more organic matter. The general philosophy is to alter soil as little as possible: its composition, structure and natural biodiversity and to protect it from degradation processes (e.g. soil erosion and compaction). **Direct sowing, surface-incorporation of crop residues and perennial cover crops**

(whether spontaneous vegetation or sowing appropriate species) or use of **green cover crop** are some of the techniques of conservation agriculture (Source : ECAF (European Conservation Agriculture Federation)).

The soil conservation techniques are helpful to spend less time and labour on land preparation, achieve lower fuel consumption, less air pollution, less chemical inputs, increase carbon content and biological activity of the soil, decrease soil erosion, nitrate leaching.



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Direct drilling (with or without cover crop) one of the successful forms of soil conservation agriculture

Seeds for LIFS

The current available seeds come from research programmes designed by large international companies for High Input Farming Systems. Genetic variance and heritability traits of economic interest, such as grain yield, have generally been found to decrease when moving from high to low input conditions. Seeds which are developed for intensive production are adapted to high levels of chemical inputs and do not perform well in LIFS, threatening their economic viability. There are very few independent breeding programmes based on local varieties and under low input conditions. The important questions are: Who is going to produce the LIFS seeds so that they are available in adequate amounts on the market? Therefore, it is important to:

- Collect the existing material (pure line) and test it in different conditions
- Make local seed producers more aware of the specific requirements of seeds appropriate for LIFS
- Develop independent seed research programmes

An important diversity of low input farming systems in Europe

LIFS include extensive mixed farming, grassland systems, sylvopastoralism, organic farming, Integrated Farming, family holdings. Today, low input systems exist for two main reasons: environmental constraints (e.g.: in mountain areas) or as a result of farmers' choice (autonomy, health, environment). Additionally, the economic value may be a significant driving force (e.g.: Protected Designation of Origin (PDO) products, direct marketing or agri-tourism). Many PDO products have very strict management requirements which limit negative environmental impact and match very well farming practices of LIFS.

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Driving forces : High Input Farming Systems vs. Low Input Farming Systems

Technical drivers as mechanization, high land prices, high agricultural prices, and policy drivers push towards HIFS. LIFS are better adapted to cope with instability of commodity prices as they do not rely so much on external inputs.

Organic Farming and Integrated Production (or farming) : two main concepts for LIFS

Organic farming (source : new Council Regulation (EC)834/2007)

Combines best environmental practices, a high level of biodiversity, the preservation of natural resources, the application of high animal welfare standards and a production method using natural substances and processes

Aims at producing a wide variety of foods and other agricultural products that respond to consumers' demand for goods produced by the use of processes that do not harm the environment, human health, plant health or animal health and welfare

The maintenance of plant health by preventative measures, such as the choice of appropriate species and varieties resistant to pests and diseases, appropriate crop rotations, mechanical and physical methods and the protection of natural enemies of pests

The maintenance and enhancement of soil life and natural soil fertility, soil stability and soil biodiversity preventing and combating soil compaction and erosion, and the nourishing of plants primarily through the soil ecosystem

Integrated production (source : IOBC technical guidelines for integrated production of arable crops in Europe)

Promotes production systems that respect the environment, are economically viable, and sustain the multiple functions of agriculture, namely its social, cultural and recreational aspects

Secure a sustainable production of healthy crops of high quality and with a minimum occurrence of pesticide residues

Priority to the use of natural regulating mechanisms, Promotes and maintains a high biological diversity in the agro-ecosystems concerned and in surrounding areas

Preserves and promotes long-term soil fertility, minimise pollution of water, soil and air.

General requirement for Integrated production

The ecological farm infrastructures (= ecological compensation areas) have to cover at least 5% of the entire farm surface excluding forests.

Cultivars must be selected that provide a good general health status and are resistant/tolerant against at least one major disease.

Long rotation (at least 4 years)

Low intensity cultivation is preferred. Deep ploughing (25 - 30 cm) is permitted only in exceptional cases.

The supply of major nutrients must rely on data from chemical soil and/or plant analyses carried out at defined intervals (3-5 years).

Weed management should be achieved, as far as possible, by an appropriate crop rotation.

Biological, biotechnical, physical or agronomic plant protection methods must be preferred to chemical methods if they provide satisfactory control (Regional guidelines must provide a list of pesticides permitted without restriction and of products permitted but with restricted use)

How can policy support LIFS ?

The existing LIFS could be better supported by policy instruments (e.g.: AEM, LFA) or supported by consumers in case of an added value of products (PDO or a specific label for LIFS). More information on the benefits of LIFS is also needed and, in particular, concerning environmental and agricultural practices: definition of relevant indicators and research programmes (links with High Nature Value farmland, multifunctionality, energy efficiency, Life Cycle Analysis, as well as social aspects). Finally it is important to develop independent advisory system, not linked to a particular company, cooperative or product and provide farmers with access to experimental farms open for farmers and agricultural advisors, offering up-to-date solutions for sustainable farming as skills of farmers can replace off-farm inputs.



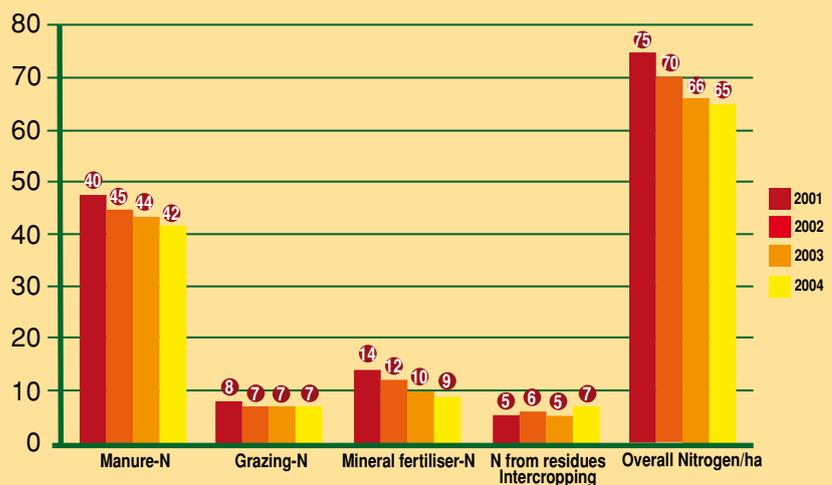
The Ecopoints system of Lower Austria: an example of subsidising low intensive farming

Ecopoints system has been introduced as a subsidy system for farmers in Lower Austria to improve the cultivated landscape quality and to promote environmentally friendly farming. The agro-environmental payment is based on indicators ie. crop rotation, soil cover, parcel size, fertilising intensity, mode of manuring/fertilising, pesticide use, cutting rate (for meadows) or stocking rate (for pastures) and grassland age. Landscape features are also transformed into ecopoints.

Ecopoints are summed up for the whole farm and the appropriate premium is calculated.

In 2007, 4 000 farms covering ca. 78 000 ha agricultural land participated in the program. The average premium for these farming enterprises was about 370€ per ha and year in the period 2001-2006 and will be around 290 €/ha in the period 2007-2013.

Nitrogen management results show a very low consumption of mineral N per ha (less than 9 kg/ha) and a decrease (- 13%) of the total N pressure/ha during the contract.



Trend of N/ha applied in the period 2001-2004



Réalisation
Solagro, JRC, 2007

Conception graphique
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