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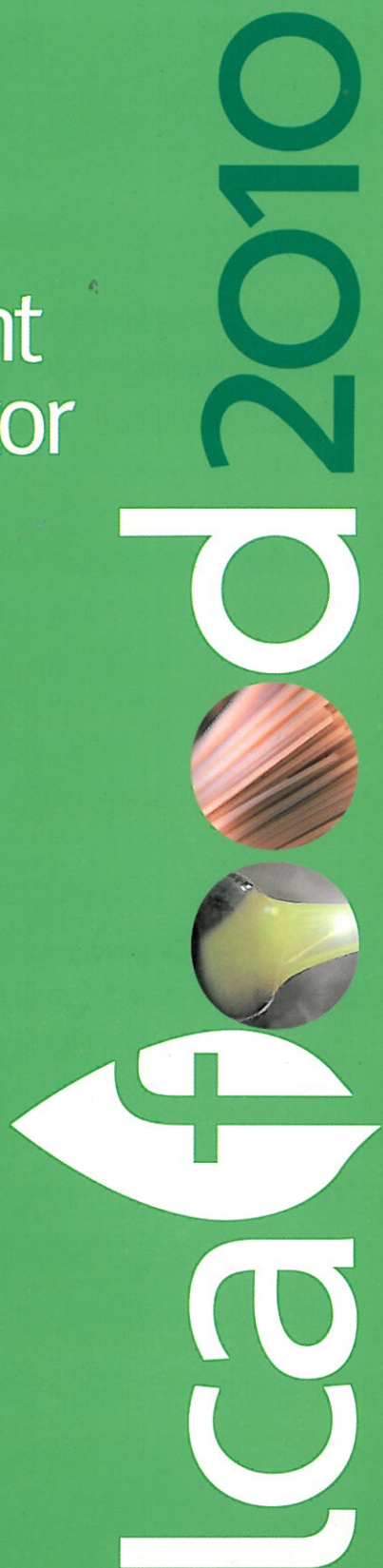
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Product Categories Rules for flowers production

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ABSTRACT

Floriculture is one of the productive activities that can get more benefit by using techniques that respects the ecological equilibrium. It is necessary to establish Product Categories Rules (PCR) in order to provide the information for the creation of an Environmental Product Declaration (EPD) on flower production. The PCR specifies requirements for LCA study, system boundaries, data quality requirements, the format and content of EPD itself, in order to guarantee the correct comparison of the EPDs of products belonging to the same category. Product Category Rules for "cut flowers" and "flower in vase" have been developed by studying flower producers of the Distretto di Terlizzi (Bari). The obtained results give a tool to reduce environmental impact of flower production and generally of all greenhouse cultivation, through an integrated approach during all the phases of the life cycle of flowers: production, distribution, use and treatment at the end of life.

Keywords: Flowers production, EPD, Product category rules, LCA

1. Introduction

Floriculture in Italy has a complex productive structure: this sector is represented by different productive segments, each one with a consisting economic relevance.

There are more than 22.000 flower farms in Italy, on a surface of approximately 13.000 ha. More than 60% of the farms have tunnels, greenhouses tunnels and greenhouses, covered with plastic films and glass, equipped with irrigation systems, fertirrigation and microclimate conditioning systems.

In greenhouse cultivations (both cultivation of cut flowers and flower in vase), the irrigation is essential. The amount of water distributed to the cultivations is often more than the effective necessities of the plants and this surplus causes waste of water and pollution of the ground and of the ground water by pesticides and fertilizers, transported by drainage waters (Lomoro et al, 2006).

Benefits due to the use of techniques that respects ecological equilibrium are many: fewer costs, more attractive products for market, possible use of public financings and support, less use of chemicals and reduction of environmental impacts. But, in order to permit the accomplishment of these results, the use of green production criteria in a flower production company has to be certified and guaranteed through a specific label.

In the ambit of the IPP the Environmental Product Declaration (EPD), according to ISO 14025 standard, is an innovative voluntary tool, able to realistically communicate the impact of a product/service, favouring its social acceptance.

Main EPD elements are:

- Objective, due to the requirement to use internationally-accepted methods for life cycle assessment (LCA) in order to identify environmental performance;
- Comparable, through establishing product-specific requirements (PCR= Product Category Rules) that define the environmental performance to be communicated in order to allow the comparison between several products belonging to the same category;
- Credible, thanks to the inspection, review and follow-up by an independent verifier.

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The release procedure of the EPD according to ISO 14025 requires at the beginning the definition and approval of the Product Category (PCRs), which define the specific rules, requirements and guide lines in order to develop the EPD of one or more product categories.

Product Category Rules for “cut flowers” and “flower in vase” have been developed. PCRs of flowers has been drafted according to ISO 14025 standards, by studying flower producers of the Distretto of Terlizzi (Bari) during a Life/Env Project, through the life cycle analysis of the flower and the Environmental Review of the productive sites (LIFE04 ENV/IT/000480).

2. LCA study of flower farms

Flower production in the district of Terlizzi has fairly widely differing methods of organisation of production, even among farms producing the same kind of flowers. The survey analysed both glasshouse production on agricultural soil and using hydroponics. None of these farms uses closed cycle production (with complete recycling of the drained nutrient solution) but a semi-closed system is adopted.

Collected data have been gathered in the inventory and than into software, specific for environmental evaluation, to make the LCA calculations.

The study was used to create a database of LCA inventories for flower production to be used with simplified software for lifecycle analyses, allowing to identify environmentally-friendly production strategies.

The functional unit to which we refer the main flows of materials and energy was established as 100 cut stems for rose cultivation and 6 pots for cyclamens, with their relative packaging.

The boundaries adopted in the study include:

- The building of the production structures including the covering materials and the systems used in the growing and preserving phases (Audsley et al., 1997); The creation of the materials that make up the structures (concrete, steel, plastics) and their transport have been included in the system boundaries;
- The production of young plants in the farm and their packing and transport;
- The flower cultivation phase including the production and transport of substrate, fertilisers and pesticides.

The analyses show a trend of results that are similar for farms with the same productive system. This confirms the applicability and the compliance of the analyses carried out.

Consumption of fossil fuels for heating is the main cause of pollution in the production of cut flowers (Figure 1).

The variability of the data gathered shows that the producers are not careful in their management of the energy resources. As well as paying greater attention to the management of the microclimate in the glasshouses, other possible ways of saving energy and causing less impact on the environment are: the use in the glasshouses of layers of covering and / or heat shields; the use of renewable energy such as solar panels and wind generators, the use of residual heat from industrial production, the use of biomass for cogeneration, the use of methane in place of traditional fossil fuels.

The structures and systems have a significant effect on environmental impact generated by flower production with respect to other inputs. In particular the structures of the farms with glass covering have a greater impact than those covered in plastic film. The presence of discarded plastic sheeting suggests the need for a good solution for their final disposal. The common practice of using rainwater, given the scarcity of water supplies in the south of Italy, should be further encouraged (Attanasio et al, 2007).

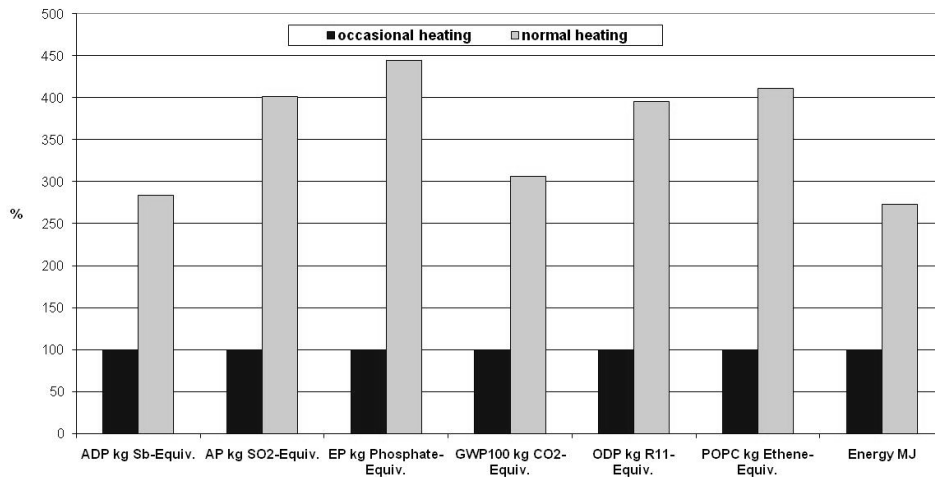


Figure 1: Comparison between farms producing with normal heating and with occasional heating

On the base of LCA study, two categories of product have been identified to write up the PCR: flowers in vase and cut flowers.

3. Definition of the Product Category (PCRs) of flowers,

The PCR specifies the requirements for the LCA study, system boundaries, data quality requirements, the format and content of EPD itself, in order to guarantee the correct comparison of the EPDs of products belonging to the same category.

The ISO 14025 standard indicates the following steps for the drafting of the document: 1) identification of the product category; 2) LCA of the product; 3) PCR's drafting.

The result of the LCA study on floricultural farm, have been analyzed in detail in order to carry out the right choice with regard to system boundaries, cut-off rules, allocation rules and identification of the parameters to be declared in the EPD.

According to LCA results, the system boundaries include the Construction of infrastructure and machinery, because the share on impacts deriving from their realization is significant.

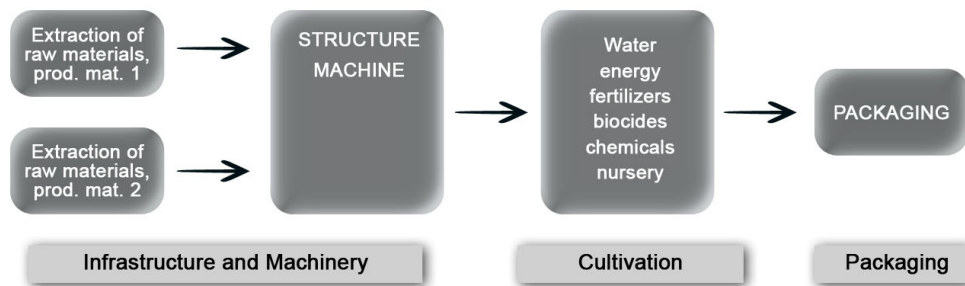


Figure 2: System boundaries

For every phase of the life-cycle has been settled down the information to include in a LCA study to the drafting of a EPD.

For example in the phase of building of infrastructure and machinery the construction of electric plants and refrigerators can be excluded, therefore system boundaries include greenhouses structures and covering materials, heating and cooling plants, fertirrigation systems, cultivation systems (soilless or in soil), other materials (floor covering, cables and poles, lanes, etc.).

In order to draft cut off rules and allocation rules, it has been verified the possibility of excluding from the inventory analysis processes/materials/components that altogether contribute in measure smaller of 1% to system total mass.

The proposal of PCRs (both for cut flowers and for flowers in vase) has been submitted to public consultation. The consultation has been activated by requesting opinions of selected interested parts (who represent as the public as private purchasers) and by open discussion of the PCR proposal in a web-forum.

Altogether, 250 stakeholders (private and public) have been invited to the public consultation: flower producers, flowers markets in Italy and Europe, national and international business associations (agriculture, commerce and tourism), Institutions (Ministero dell'Ambiente, Assessorato all'agricoltura e ambiente of Apulia), Chambers of Commerce, certification bodies, research institutes. The consultation lasted 30 days.

At the end of the process, the final version of the PCR's for "cut flowers" and "flowers in vase" has been issued. The contents of the document are: General information (scope and validity period), Product and company description, List of materials and chemical substances, Functional unit, System boundaries, Cut-off rules, Allocation rules, Calculation rules and data quality requirements, Parameters to be declared in the EPD, Other environmental information.

Even remaining in the scope of the reference standards, accordingly with target companies (SMEs) it has been attempted to introduce simplifications in EPD's contents and procedures where possible.

Both PCR for cut flowers and flower in vase show the list of materials and chemical substances that can affect human health and environment to be declared in the EPD: fertilizers, active substances used in biocides and their risk classes, other chemicals and risk phrases, refrigerants.

The functional unit for the LCA study consists of 100 stems for cut flowers and of 1 plateau containing 6 vases for flowers in vase.

PCRs show the information to be included in the EPD for every phase included in system boundaries (Table 1).

Table 1: Information to be included in the EPD for every phase included in system boundaries

Phase	Information to be included
Infrastructure and machinery	- Greenhouses (structures, covering materials) - Heating and refrigerating plants and fertirrigation systems - Cultivation systems (soilless or in soil), other materials (floor covering, cables and poles, lanes, etc.)
Cultivation	- Fertilizers, biocides e other chemicals - Nursery plants - Water, electricity and fuels
Packaging	- Product packaging

Parameters to be declared in the EPD refer to three categories of data (Table 2).

Table 2: Parameters to be declared in the EPD

Data category	Parameter
Data from life cycle inventory analysis (LCI)	Renewable energy consumption (MJ) Non Renewable energy consumption (MJ) Fresh water consumption (m ³)
Life cycle impact assessment (LCIA) results	Climate change (kg CO ₂ eq.) Acidification (kg SO ₂ eq.) Eutrophication (kg PO ₄ ³⁻ eq.)
Waste	Hazardous waste (kg) Non hazardous waste (kg)

Both PCR for cut flowers and flower in vase provides that additional information may be included, e.g. the adoption of systems for optimising water resources or recovering the nourishing solution in soilless cultivation.

4. Conclusions

The PCRs have been elaborated in compliance with the document “ECOFLOWER program, general requirement for type III ecological label of product attribution”. This document describes: the general instructions of the Ecoflower Program for EPD label release, the methodological framework, the content of the LCA study and the information to be included in the EPD declaration of flowers. The document has been verified by an accredited certification organ and evaluated as in compliance with reference standards.

The LCA, from the first phase of planting in greenhouses, to the collection and sell of cut flowers and plants in vase, allowed to evidence flows of materials, resource and energy, to quantify the environmental impact of typical flower production, looking particularly at the criticalities; it also allowed to evidence best practice, through the comparison between various productive modalities.

Floricultural production criteria based on environmentally-friendly processes and on the use of production techniques with a reduced environmental impact, provide for less use of resources, fertilizers and pesticides.

The obtained results give a tool to reduce environmental impact of flower production and generally of all greenhouse cultivation, through an integrated approach during all the phases of the life cycle of flowers: production, distribution, use and treatment at the end of life.

The environmental improvement of flower production reduces risk for environment by means of a larger control of the production cycle, by making easier the use of sustainable resources and energy, by reducing the use of noxious substances and waste generation.

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