

DESCRIPTION FOR THE GENERAL PUBLIC

A large consumption of labour and energy in conventional plowing tillage leads to greater interest of agricultural practice in simplified tillage system. Its main difference with the former system consist in replacing the plow by the other tools such as cultivator with rigid tines to tillage to a depth of 10-15 cm or total abandonment of tillage treatments and adopting so called direct sowing in the soil with maintained crop residue on the soil surface (no-tillage).

Agriculture in efforts to achieve the best possible production and economic results must take into account the requirements for the prevention of environmental pollution and conservation of natural resources. This creates the need to enhance and update the state of knowledge on the impact of different tillage systems on the environment. Issues on the impact of simplified tillage systems on the environment have already been a subject of many studies in the country and abroad. So far such evaluation had been focused mainly on assessing the effects of changes in physical, chemical and biological soil properties. The necessity to explore the whole complex of the environmental impacts of agricultural activities is emphasized in the world literature. This does not result only from the processes on the farm, but also from those that are associated with the manufacturing means of production and product disposal of. These processes, included into the so-called "the life cycle of products", may also be the major sources of environmental threats. For a comprehensive, environmental assessment and comparison of different systems it is necessary to verify in detail all processes in the life cycle of the product.

Undertaken study in the project aims to evaluate and compare the environmental impacts and life cycle costs of production of selected grain crops in the different soil tillage systems: traditional tillage, reduced tillage, direct sowing, in which conservation tillage is included.

The studies will be carried out within 3 years. Data for each system will be collected from 10 selected farms located in the Wielkopolska region. The environmental assessment of grain crop production under different soil tillage systems will be analyzed using the Life Cycle Assessment (LCA) methodology. It will include a scope of "cradle-to-farm gate", i.e. from manufacturing of means of agricultural production, through the process of field cultivation, harvesting and grain transport to the customer. The following categories of environmental impact will be considered: climate change, soil and water acidification, eutrophication, the formation of photochemical oxidants, depletion of abiotic resources (non-renewable energy, mineral resources), land use, pesticide toxicity. Furthermore, calculation methods of water and ecological footprints will be used in the research. For achieving an integrated assessment of the analyzed soil tillage systems, the calculations of environmental costs throughout the life cycle production of cereals will also be made using e-LCC methodology (environmental Life Cycle Costing).

Detailed inventory data for all production processes will be carried out, enabling verification of the environmental impacts at every stage of the life cycle. The relationship between ecological and economic aspects of crop production in different soil tillage systems will be shown. Taking into account in this research the full complex of interactions may provide a basis for an objective assessment of the soil tillage systems, as well as an evaluation of ecological threats generated in Polish agriculture.