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Fostering soil sustainability and food safety in urban agricultural areas of Naples, Italy

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A sustainable management of urban soil is of paramount importance for the modern cities, thus sustainable programs of urban agriculture are strongly supported by policy-makers to preserve urban soil from anthropic degradation, to enhance its ecosystem functions and services and to produce safe and quality food. Although urban agriculture is already a reality in Naples, it is still lacking of a scientific-based approach aiming to: i) characterise pedo-climatic properties, ii) apply site-specific sustainable management practices, iii) enhance urban food quality; iv) address potential contaminants or pathogenic microorganisms threatening food safety. UrbanSoilGreening* project aims to overcome this lack of scientific-knowledge on urban agriculture in the metropolitan area of Naples. Project activities will cover the major issues related to urban agriculture (i.e., soil degradation and contamination, loss of ecosystem functions, food safety). An operative methodology for sustainable management and protection of urban soil will be developed during 2021 in a couple of green spaces in the metropolitan area of Naples potentially exploitable for agricultural purposes, selected on the basis of factors such as proximity to potential sources of contamination. The urban soils will be characterised to assess their physicochemical properties and identify possible contaminants such as potentially toxic elements (PTEs) and hydrocarbons. In the potentially contaminated soils, the bioavailable and bioaccessible fractions of PTEs will be extracted from soil by standardised analytical procedures. In the absence of soil contamination, the green spaces will be still exploited for food production and agricultural purposes. On the other hand, they will be converted into ornamental or spontaneous low-management gardens. The cultivation techniques would address the general interest of preserving the soil and promoting a sustainable management of sites (e.g. organic farming, synergistic techniques, on-site production of high-quality compost to recycle vegetable waste and promote the circular economy, etc.). The cultivation of uncontaminated green spaces will be done in the spring-summer time, selecting food plant species suitable for local urban horticulture. The greening will aim to create areas accessible to local citizens and associations (cooperating actively with project's team during plant growing season), with a social function as meeting places for the neighbourhood, suitable for hosting social events and activities. Food quality will be evaluated by morphological and quality parameters and chemical analyses. Near infrared (NIR) spectroscopy

will be also applied to rapidly assess food quality with minimum sample processing. The possible presence of PTEs and pathogenic microorganisms (e.g., Clostridium, Escherichia, Listeria and Salmonella genera) in food products will be evaluated to establish their chemical and microbiological safety. Major breakthroughs and achievements will be communicated to main stakeholders in education and public outreach activities and scientific events. At the end of project, guidelines for the sustainable management of urban green spaces producing high-quality and safe food crops will be disseminated as electronic document.

* Multidisciplinary study to improve the sustainability of urban soil, to protect its ecosystem functions and services, and to enhance the safety and quality of food from urban agriculture (FRA-202009291319). Programma per il Finanziamento della Ricerca di Ateneo UniNA, call 2020, line A.