



LAZIO ACTION PLAN

PP6 Experimental Zooprofilactic Institute
of Lazio and Toscana M. Aleandri



Istituto Zooprofilattico Sperimentale
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***LINDANET: EUROPEAN NETWORK OF LINDANE WASTE AFFECTED
REGIONS WORKING TOGETHER TOWARDS A GREENER ENVIRONMENT***

I. CONTACT INFORMATION

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II. POLITICAL CONTEXT

In this document we propose an Action Plan for the Lindanet Project that originates from what we have learned by the Lindanet Interreg Europe project which aims to join efforts among European regions to work together towards the improvement of the Lindane issue.

Lindane is the common name of the gamma isomer of hexachlorocyclohexane (HCH), a pesticide that was widely produced during the second half of the 20th worldwide and was banned in Europe since 2007. HCH isomers are Persistent Organic Pollutants (PoPs) and the International Agency for the Research on Cancer has classified Lindane in group 1 (carcinogen) and HCH isomers in the group 2B (possible carcinogen) (IARC, 2018).

It has been estimated that there are still more than 2,25 million of tons of HCH highly contaminated soils in the EU area. Until now, the complete reclamation has concerned only the most contaminated soils around the polluted sites or waste landfills.

Where the restoration of the environment was not possible due to dilution of chemicals in different environmental compartments (water, soil), the prevention was pursued through restrictive actions on contaminated lands, as the ban of agricultural activities. This, proved significant in polluted areas, caused great economic losses.

Consequently, the intention of the LINDANET project is improving knowledge and finding solutions together with other Regions.

III. STRATEGIC CONTEXT

THE ACTION PLAN AIMS TO HAVE AN IMPACT ON:

- ☐ Programme for Investment for growth and jobs
- ☐ European Territorial Cooperation Program (Interreg)
- ☒ Another regional development policy instrument

Name of the policy instrument addressed: **Characterization Plan of riparian agricultural areas** (derived from the former **Regional Monitoring Plan on Chemical Residuals**)



Lazio Region Action Plan: **Increased knowledge by the Study on the absorption of HCH by fruit crops in polluted areas**

The “Regional Monitoring Plan”, merged since 2020 into the “Characterization Plan of riparian agricultural areas”. This Characterization Plan derives from an Agreement Program between the Ministry of Environment (MATTM) and the Lazio Region in 2019 for the implementation of safety interventions and reclamation of the SIN “Bacino del Fiume Sacco”.

This Characterization Plan was approved by *Determinazione regionale n° G08695 of 22/07/2020. Intervention attribution "Caratterizzazione Aree Agricole Ripariali"*, with reference code *CUP F67F19000440001*. The duration of the Plan will be from 2020 to 2022, with a possibility of extension.

The objective of the Characterization Plan of riparian agricultural areas is to characterize the concentration of contaminants in the soils, vegetables and milk around the Sacco river (the secondary source of pollution), with the aim of determining whether the soil is suitable for agricultural purposes or whether it is not suitable for any use and needs to be remediated (decontaminated). The Sacco river riparian areas will thus be divided in zones, depending on the contaminant levels.

Policy instrument and related opportunities for the action plan: The policy instrument is currently in an early stage. The sampling methodology in the different matrixes and data processing has been planned, but it has not started yet. The first information is expected to be produced not before that 2 years. In a later stage, and once all the data has been gathered, criteria for the zoning of the riparian areas in not suitable for any use or suitable for agricultural (or other uses) will be established. Implementing the action plan in parallel to the development of the policy instrument increase the opportunities of influencing it.

Impact of Action Plan on Policy instrument: the Action Plan aims to conduct a research on the passage of HCH isomers in some horticultural crops grown in experimental gardens in the Sacco River SIN., consisting specifically in verifying whether some cultivable vegetables can absorb HCH in the edible part for human and if different species of vegetables behave differently.

In the Sacco river SIN, the soils still have moderate levels of HCH contamination that can enter the food chain even after many sources of pollution have been removed or confined in a safe way.

In this context, the proposed Action Plan wants to provide useful data for better management of agricultural activities and promote research in this field.

The proposed Action plan can improve the policy instrument, indicating a different approach for the monitoring of polluted areas, proposing the control not only on the general matrixes at risk (eg: soil, vegetables, milk) but also on matrixes that could be less subject to contamination to promote a selective ban on cultivation (e.g.: differentiating among vegetable species or analysing edible fruits separately from other parts of the plant). This will generate two clear benefits in the addressed policy instrument:

- It will establish a methodology for developing new studies of on potential cultivable vegetables that can turn areas not suitable for any use to suitable for determined agricultural uses.
- It can be directly incorporated in the criteria for the zoning in case the vegetables studied under the action plan do not absorb HCH in the edible part.

Additionally, the Action Plan will improve the channels of communication of the results obtained with the addressed policy instrument.

Lessons learned by the exchange of experience from which the idea of Action Plan developed: during the Lindanet knowledge exchange and the conducted SWOT analyses, we have learned that many of the available techniques cannot guarantee complete cleaning at least where contamination is widespread over a large scale and is diluted in the environment.

During the ITW2, from the good practices entitled “HCH contaminated biomass for production of biogas could support phytoremediation concepts” presented by Department of Isotope Biogeochemistry Helmholtz Centre for Environmental Research - UFZ (Germany), we learned about the evidence of the uptake of HCH by some plants and about the possibility of biodegradation by the rhizosphere. Therefore, the contaminated biomass can be treated in a biogas reactor where HCH is transformed into biogas and the remaining product can be used as fertilizer.



From the project LIFE POP WET presented by Dr. Pavel Hrabak during ITW3 (Title: HCH tree bioaccumulation: Development of an indicative method of HCH groundwater irrigation via tree phytoscreening) we learned that bioconcentration within trees and herbaceous plants is not homogeneous in all parts of the plants. It seems to depend by age, species and seasonality and consequently it is not sure that HCH can reach the edible part of the vegetables.

From these presentations, we learned that there is a need to obtain more data on the ability of HCH to contaminate the edible part of plants in order to characterize the risk for humans and at the same time promote research on phytoremediation. Our Action plan is designed to provide some data in this field.

A. OBJECTIVES OF IZSLT ACTION PLAN

short-time objectives: verify whether some cultivable vegetables can absorb HCH in the edible part for human and if different species of vegetables behave differently

medium-term objectives: provide farmer stakeholders with better knowledge of the health risk associated with the consumption of local crops and pay them more attention given the huge impact they have received from pollution

long-term objectives: provide government stakeholders with useful information for a controlled management of the economy in the agricultural field. Produce valuable data to trigger more research on crops that could be not at risk. Promote good agricultural practices in polluted area.

PLANNED ACTION

ACTION 1: Study on the absorption of HCH by fruit crops in polluted areas

Relevance for the project

We want, with our Action Plan, to produce some experimental data, which, together with all the other activities foreseen in the addressed policy instrument will support the stakeholder regional Authorities in taking decisions about keeping or removing the ban to some agricultural activities. At present, the addressed policy instrument aims to remove the ban on cultivation from areas that the sampling plan will find uncontaminated. To achieve this goal the plan foresees to sample the soil and pre-existing vegetation on lands banned by cultivation throughout the valley, so that the plants sampled will be likely spontaneous or forage plants. Our experimental garden will help giving more data on some plants grown on surely contaminated lands (chosen among vegetables less studied and among those easier to study in the framework of the project), so the studied species will be different from those analysed by the policy instrument. At the end of our study, we will produce more knowledge on the safety of vegetables, even if cultivated on contaminated soils, or nearby them. Our experimental data will support the choice of the cultivation of some species instead of others.

In this context, our Action Plan can help the policy instrument giving more data to promote a selective cultivation throughout the river valley at least in the areas furthest away from polluting sources. Unfortunately, because of the short study period, only few edible species will be examined.

Our research has a double relevance for the project: the first is to evaluate the risk deriving from the consumption of some local crops on HCH contaminated areas and the second is to provide useful data for phyto-remediation.

Inspiration:

The idea at the basis of our action plan derives from what we have learned during the development of the LINDANET project.

Several attempts of phytoremediation have been carried out, with different results, depending on the physiology of different plant and managerial issues (ITW2).

Through the aforementioned lessons learned by the Project, we know that HCH is absorbed by plants, but that it spreads only in some part of them. Given the impossibility of completely remediation, until now, knowledge is scarce on type of food agriculture that can be practiced in areas moderately contaminated with HCH without affecting human health or food chain. In this field the Action plan will make research.

Objectives for the improvement of the policy instrument:

The Action Plan has the following objectives related to the improvement of the policy instrument:

1. To establish a methodology for developing new studies of on potential cultivable vegetables that can turn areas not suitable for any use to suitable for determined agricultural uses.
2. To improve the channels of communication of the results obtained with the addressed policy instrument.
3. In case the vegetables studied under the action plan do not absorb HCH in the edible part, the cultivation of these vegetables could be considered as a potential use of the agricultural soil in zoning criteria.

Nature of the action

The action plan aims to verify whether the vegetables can absorb HCH in the edible part for human and if different species of vegetables behave differently.

The action consists in the planting of experimental gardens in surely contaminated soils around the Sacco river where the land is now subject to the prohibition of any agricultural use.

Due to the shortage of time only some species of edible vegetable will be studied. They will be chosen on the basis of the season and the geoclimatic attitude of the area for agriculture.

Activities to be developed for the action completion

0. Request to the Region for general endorsement (already done)
1. Study of some small territories in order to choose the most apt for cultivation of small vegetable gardens on the basis of the demonstrated contamination of soil, collaboration of farmer, practical feasibility.
2. Selection of at least 1 vegetable garden
3. Communication to the Master of the Municipality where the garden is located
4. Writing of an experimental protocol for cultivation of vegetables for the aforementioned research
5. Contract with owner
6. Periodic collection of grown vegetables: at least three species of vegetables cultivated and sampled in representative numbers
7. Laboratory tests for HCH isomers (where soil contamination data are missing, analyzes



- of the soils will be performed)
8. Report to the Region and to Lindanet partnership of the experiment results

Stakeholders and roles

- Private owners: they collaborate in the cultivation of gardens according to the protocol. They allow access to the garden for sampling. They undertake not to use the cultivated vegetables or their waste for human or animal nutrition.
- Regional officers: they approve the experimental protocol and provide the necessary authorizations
- Municipality Masters: they approve the experimental protocol and provides the necessary authorizations

Operators involved in the experiment:

- Local health officers (veterinarian): they look for volunteer farmers residents near the river, in the SIN area, and put them in contact with the IZSLT
- Agronomist (IZSLT): he collects samples of the cultivated species, compile sampling document and take them to the laboratory of IZSLT. He evaluates whether to carry out sub-samples (roots, leaves, fruit).
- Chemist (IZSLT): he performs laboratory analyzes and evaluates the presence of different HCH isomers in the analysed matrices
- Epidemiologists (IZSLT): they analyse the data statistically and interpret them together with the agronomist and chemist

Development period: 12 months.

Indicative cost: € 10,000.

Indicative sources of financing: IZSLT funds (from Lazio Region)

IV. ACTIONS TIME SCHEDULE

	Months (January 2021 – December 2021)											
Activity	1	2	3	4	5	6	7	8	9	10	11	12
1-Study of territories												
2-Selection												
3-Contacts with local authorities												
4-Protocol												
5-Contract and plant												
6- Collection of vegetables												
7-Lab tests												
8-Reporting												