



Poplars implantation: a storytelling of an experience

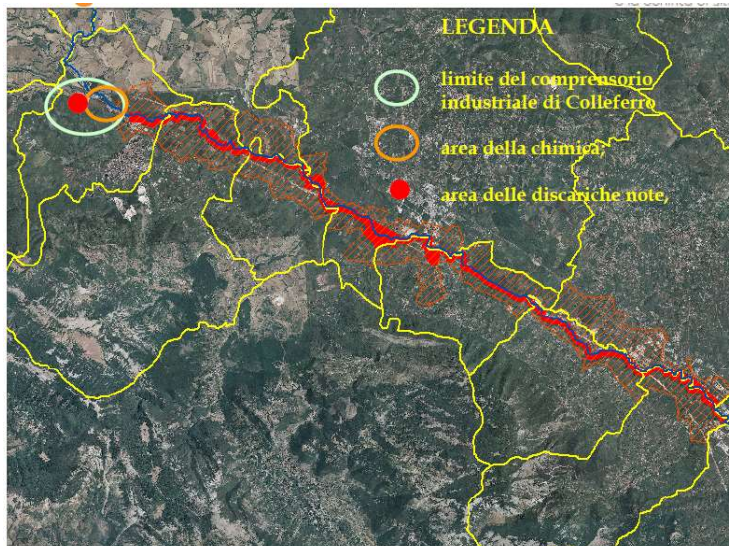
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Background:

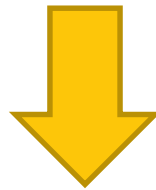


Spread of pollutants from the primary source (industrial site) is related to the presence of a secondary passive source which is the river



The **Sacco river** acts as a secondary source of contamination as it receives, accumulates and spreads contaminants in the riparian areas along the river valley

To carry out the remediation of wide agricultural areas **exposed to the river** and contaminated by HCH isomers at various concentrations, a phyto-purification experiment was started with **poplar** plantations



The experiment was carried out in two riparian areas banned from other types of agriculture (food and fodder)

The genus *Populus* is characterized by high genetic variability (about 30 species distributed in the Northern Hemisphere). Is usually grown for plywood and paper production. Its adaptation to different environments and its fast growth make it suitable for the selection of specific strain for phytoremediation



the genus *Populus* has demonstrated in the experiment its purifying ability towards soils with HCH pollution

The goal was:

- the remediation of large agricultural areas where the removal of soils was unfeasible because of the dilution of pollutant in a large area
- to allow farmers / breeders to develop a new agro-energy agriculture in territories forbidden to food crops

**Funding, Legal Responsibility and
coordination:** Lazio Region

Scientific project:

Institute of Agro-Environmental and Forest Biology (IBAF)
of the CNR Research Area of Rome

Plantation, growing, selling: Private
farmers



***Populus spp.* has shown its ability to accumulate numerous toxic organic compounds (heavy metals, hexachlorocyclohexane). (1)**

At the bases of the poplar phytoremediation there are some characteristics:

- the plant's ability to acquire beta HCH through the roots
- the plant's ability to favor the activity of microorganisms degradation in the rhizosphere
- the high growth rate of the plant
- the high transpiration rates
- a dense root system

1. Massacci et al., 2012 (Silvae – Anno VII n. 15/18 pag. 125))

First experimental phase in lab:

- Testing clones, methods and processability of the product

Second phase in field:

- Planting poplars in the agricultural land (2 Municipalities: Segni and Anagni)
- Short rotation forestry
- 3 seasons: 2007, 2008, 2009



The irrigation of the poplar plants was guaranteed through the construction and / or restoration of some deep wells.

In the absence of water wells, the waters of the Sacco river previously filtered were used.

In some cases, the plantations were irrigated with drip systems.

The best results in the field were obtained with the Monviso clone, associated with the simultaneous inoculation of bacteria, compost and calcium peroxide.



The degradation of almost 30 - 40% of beta isomer in the rhizosphere was measured after one year and about 50% after two years,

An additional 10 % of reduction can be obtained with bacteria inoculation

The alpha isomer reduction was smaller than beta isomer (close to 30 %)

Poplars are suitable for creating plantations with a high density of plants (5,000-10,000 per hectare) and very short rotation turns (or Short Rotation Forestry).

Short rotation Forestry can last five-year, two-year and annual.

The annual cycle has shown greater ability to remove contamination from soils.

Poplar crops Short Rotation Forestry have shown to be suitable for:

- reinforcement of safety measures
- decontamination of the land
- economically profitable activity **if proper planned and managed**

In this case the planned final destination of poplar wood should be **biomass production**

It is important to note that:

for the success of the agricultural economic conversion, the processing plant for biomass (industries of bioethanol and biofuel) should be situated no to far from the production site (*estimation: 30 km*)

The Region promoted the creation of such plant in the area by some public/private agencies, but this project failed so far

The farmers had to organize themselves to sell their product

What happened ?

In order to deal with the loss of agricultural income, a series of compensations have been foreseen by the regional Government, in the Sacco Valley (Italy), for farmers participating at the poplar planting program since 2005. (Regional Determination G01897, 16/02/2018)

Furthermore, transportation costs for the delivery of the products have been reimbursed for distances greater than 30 km from the place of production of the wood chips.

Conclusions:

to allow the agro-energy conversion of the valley it is necessary to activate the energy production chains nearby

(this is crucial to ensure the profitability of no food agriculture)

despite compensation, the farmers are still not satisfied by the income from poplar plantations in the Sacco Valley



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Thank you!

Questions welcome

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