SUMMARY

It is well known the negative impact on the safety of food products as a result of assumption of chemical contaminants through farm animals nutrition.
The diet is one of the main sources of exposure to environmental contaminants for all living organisms. Soils and groundwater resources, which accumulate large amounts of pollutants, transfer them to plants and then to the animals through the food chain. Neverthless, for certain contaminants, levels of significant contamination are required to have negative repercussions on the quality of food products obtained from animals.
For this reason, studies relative to organic contaminants diffusion patterns and dynamics through the soil-plant system are essential to understan their global cycle and to assess the risk of transmission in the trophic chain.
Among the known critical or emerging contaminants that have been involved in this research, our unvestigations were focused on the Hexachlorocyclohexane (HCH), and in particular the β-isomer (β-HCH), a very persistent, lipophilic and major by-product, togheter to α-isomer (α-HCH), in the synthesis of the insecticide 'Lindane' (or γ-HCH), no longer authorized; the Pentachlorophenol, an organochlorine compound used as a herbicide, wood preservative and for other uses, which is also now prohibited. The present research has also involved the so-called "Nonylphenol", which is used in large quantities in surfactants and in other industrial fields. Under the term "Nonylphenol" a mixture of different isomers of the phenol are included, to which it is associated a branched alkyl radical, which is composed of nine carbon saturated atoms.
The research activity related to the β-HCH and α-HCH was focused on the study of its presence in several wild plant species sampled in an area known to be contaminated by these substances, the river Sacco Valley in the Lazio region. Activities related to Pentachlorophenol and Nonylphenol focused on the development of chemical analytical procedures. For Pentachlorophenol, a procedure has been developed, applicable to vegetable food and milk, ensuring performance parameters compliance with the standards specified in the regulations (maximum permissible limit: 0.01 mg / Kg fat - Reg. EC 396/2006 and 0.01 mg / kg - Reg. (EU) No 258/2010).
The development of the procedure for the detection of residues of "Nonylphenol" concerned food of animal origin such as milk, eggs and fish products.

For what concerns the α-HCH and β-HCH contaminants, they were analyzed within the catchment basin of the Sacco River. The sampled plant species and their geographical location are shown in Fig. 1. We analyzed species of trees, shrubs and herbaceous at different distances from the river banks . The different parts of the plants were analyzed separately (leaves, branches, fruits, ...), with the aim to determine the single specific levels of contamination . Among the tree species, those most sampled were Juglans regia (Common Walnut) and Prunus Spinosa (blackthorn).
Relevant level of contamination for β-HCH was found in a numbe of plant species, confirming the contamination of river neighboring soils.
The result obtained on the species Prunus Spinosa and Juglans regia have provided specific data relative to HCH contamination of their edible parts (fruits). All samples of Prunus Spinosa and Juglans regia from areas adjacent to river showed quantifiable residues of β-HCH, with higher values in the leaves and branches matrices. The fruits of Prunus spinosa (blackthorn) have exceeded the maximum residue limits (MRL) of 0.01 mg / kg (EC Reg. 396/2006 and Reg. (EC) No. 149/2008).
Data on the β-HCH on walnut samples (Juglans regia) indicated a strong contamination of branches and leaves from trees collected near the river, while the same samples from areas more distant from river banks (distance> 70 m) presented significantly lower levels of contamination. This evidence csuggested that the contamination decreases by increasing the distance from the riverbanks and corfimed the river as the main transport way and secondary source of contamination .
The situation appears to be very different with regard to the edible part of Juglans regia (kernels); in fact, 8 out of 9 analyzed samples were free from contamination by highly lipophilic β-HCH (<LOD),

in spite of the high-fat content of this matrix (<0001-0006 mg / kg), although 5 of these were coming from plants whose branches and leaves were very contaminated. All data on kernel samples did not exceed the value of 0.010 mg / kg, which is considered the maximum residual limit (MRL) for this type of food matrix (Reg. EC 396/2006 and Reg. (EC) No. 149 / 2008). The unique quantifiable result of among kernel samples (> LOQ) showed a significantly lower value than this limit (0.006 mg / kg), although it was coming from the contaminated area closest to river, from a plant with ripe fruits and high contamination of branches and leaves. The results have revealed how the kernel matrix has not been concerned by the contamination, in contrast to the woody parts of the plant (branches) and leaves. As the walnut plant is very important for the economic sector, as it produces a precious fruit readily marketable like the appreciated wood that is used in industry and trade, these results deserve further study in view of a potential use of tree species for the decontamination of contaminated areas e for their economical redevelopment.