



Asian knotweed

(*Reynoutria spp.*)

Experiment to compost Asian knotweed in the Orge river basin (Essonne department)

Orge River Board

- The river board comprises 62 towns et 9 intermunicipal boards and urban communities in the Essonne department.
- Founded on 1 January 2019, the board is the successor to three former boards, namely the Board for the lower Orge valley (SIVOA), the Board for the upper Orge river basin (SIBSO) and the Board for intermunicipal cooperation on hydraulics and water treatment in the Limours region (SIHA).
- The main missions include:
 - valorisation of the territorial ecology;
 - achieving good ecological status of aquatic environments;
 - flood prevention;
 - control over water-treatment issues;
 - management of wastewater-treatment plants.
- Contact : Mathieu Gouirand - mathieu.gouirand@syndicatdelorge.fr

Zymovert compost company

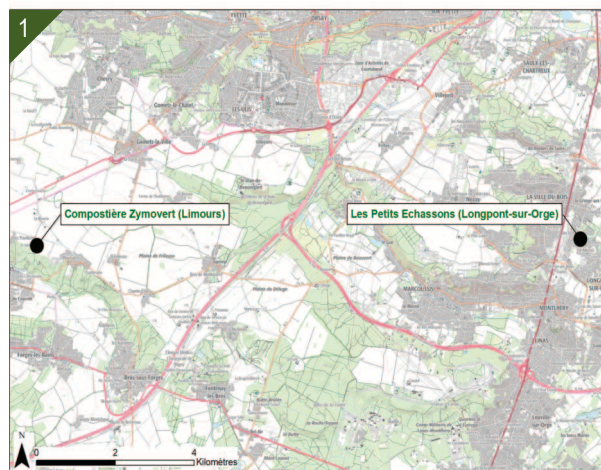
- The composting company is located in the town of Limours (Essonne department).
- Its main missions include:
 - recycling of plant waste;
 - sale of compost, top soil, acid compost and mulch.
- Contact : Bruno Daix - contact@zymovert.com

Intervention site

- The knotweed was composted by the Zymovert company and the compost was spread on the Petits-Échassons site, a property of the Orge River Board in the town of Longpont-sur-Orge. The site limited the risks of plant dispersal in case the experiment failed in that it is a former agricultural site surrounded by stone walls and closed to the public.

Disturbances and issues involved

- Asian knotweeds are considered plant IASs (invasive alien species) in France. Japanese knotweed is widely present in the Orge Valley and in some places threatens the richness of the local fauna and flora.
- Large beds of knotweed must be regularly cleared because they can hinder automobile traffic. They can grow to the point that they block roads and require expensive maintenance work.



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1 - The composting and experimental sites.
2 - The territory of the Orge, Rémarde and Prédecelle River Board.
3 - Beds of Asian knotweed along the banks of the Orge River.

Interventions

■ Context

- Since 2004, the Orge River Board has implemented a management programme for Asian knotweed throughout its territory. Different methods have been tested (cutting, uprooting, grazing, stripping of infested soil, tarping, etc.) to find the best suited to the different contexts and constraints encountered. Each year, several metric tons of green waste, including that of plant IASs, are produced in the framework of environmental management programmes and development projects.
- In 2018, 392 metric tons of green waste, including 4 tons of Asian knotweed produced by an uprooting campaign, were processed by the Orge River Basin.
- According to normal management procedures, IAS waste is placed in sealed bags and stored in a container on a dedicated platform. A company then transports the container to an incineration centre.
- To avoid incineration and make use of the biomass produced by management operations, a composting experiment was carried out in 2018.

■ Objectives

- Improve the carbon balance of IAS processing.
- Return organic matter to soil without risk of later IAS dispersal.

■ Steps in the experiment

- The composting unit received 3.85 metric tons of Asian knotweed, in the form of stalks, leaves and rhizomes. A further 8 tons of cut grass and woody waste were added to the biomass.

Phase 1. Composting

- Composting took place from July to November 2018.

Table 1. The different composting steps.

Dates	Step
04 July 2018	Start of the composting process
05 July 2018	Start of airing
09 July 2018	Watering and mixing
23 July 2018	Watering
26 July 2018	Mixing
02 August 2018	End of airing
14 September 2018	Mixing
24 September 2018	Mixing
13 November 2018	Screening
20 November 2018	End of the composting process

- Following mixing, the plants were chopped to make fragments more uniform in size and then placed in long mounds. The chopping of the green waste took place in a dedicated zone of the composting unit.
- Over the first 15 days, the mounds were aired five minutes every hour, then airing was reduced to three minutes every hour. At the same time, the mounds were watered to stimulate the composting process.
- A constant temperature of 70 to 80°C for several days was necessary to ensure that the compost was aseptic. Sensors were placed in the centre of the mounds for continuous monitoring of the temperature. The data was transmitted to and stored on a computer.



4 - Depositing the knotweed waste.
5 and 6 - Chopping and placing in mounds.

- Six to eight weeks were required to obtain an organic compost that was considered satisfactory. Over that period, watering was reduced and the mounds were regularly mixed by a "mixer".
- The compost was then screened to produce a uniformly fine texture. The resulting homogeneous compost, compliant with applicable standards, was then stored in a dry place to limit the impact of winter rains.

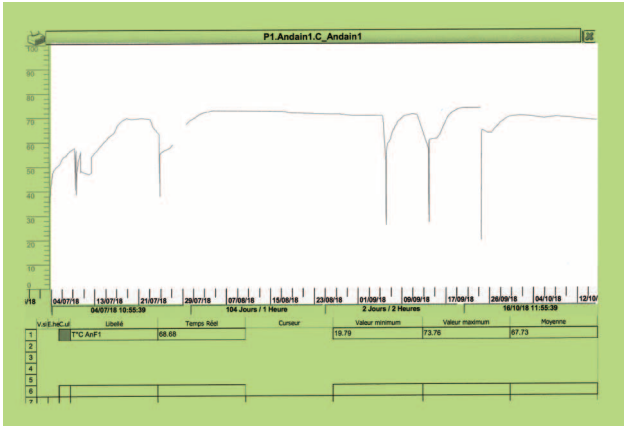
Phase 2. Spreading the Asian-knotweed compost

- The compost comprising the Asian knotweed was stored in a dedicated hanger until the beginning of April (the start of the growing period for knotweed). The mounds were kept separate from the other types of compost to avoid any mixing. The compost was then transported to the spreading site.
- The compost was spread in two different ways:
 - a first test plot where it was simply spread on the ground, without any mixing;
 - a second test plot where an excavator mixed the compost with the underlying soil (to a depth of a few dozen centimetres).
- Once the compost had been spread, the site was fenced off with barricade tape.
- Monitoring was carried out every month over two growing seasons to check for any knotweed sprouts.

Results and costs

■ Technical results

- An increase in the temperature of the mounds was noted during the first week of composting, before stabilising until the end of the composting process. The drops in the recorded temperature corresponded to measurements taken during mixing.



Temperatures recorded in the mounds. The drops in temperature correspond to measurements taken during mixing.

- Initial degradation of the organic matter was observed 15 days after being placed in the mounds. The leaves started to break down and the stalks of Asian knotweed became dry and brittle. Several weeks in the hot environment resulted in the progressive degradation of the woody tissue of the rhizomes.
- In November, four months after the initial chopping of the plants, prior to screening, all knotweed residue had dried and no sprouts had been observed in the mounds.
- The spreading plots were monitored starting in the spring of 2019 and no sprouts were observed that year on either plot. No sprouts of Asian knotweed were noted in 2020 as well.



Spreading of the Asian-knotweed compost.
7 - Compost simply spread on top of the soil.
8 - Compost mixed with the underlying soil.

■ The vegetation on the plot with the compost simply spread over the ground was ruderal, essentially herbaceous, and rather meagre with some bare ground. The second plot where the compost was mixed with the soil had the same type of vegetation, but denser.

■ In 2020, the plot had become completely covered with plants and one part had reverted. The dominant species observed during the field survey were Creeping thistle (*Cirsium arvense*), Prickly ox-tongue (*Helminthotheca echinoides*) and Common thistle (*Cirsium vulgare*). No knotweed was observed.

■ Composting of knotweed is an effective technique with no risk of dispersal if the composting process is correctly implemented.

■ Financial aspects

■ Financially speaking, in the context confronting the Orge River Board, the use of composting to manage Asian knotweed turned out to be less expensive than incineration.

■ Incineration of one ton of knotweed costs 233 euros (before VAT), whereas one ton of knotweed processed in a composting unit costs 30 euros (before VAT), i.e. composting is almost eight times less expensive. What is more, composting the knotweed could contribute to the development of local economic activities.

■ Composting also reduces the workload involved in transporting the green waste because it can be collected on the work site using the Board truck and transported directly to the Zymovert company. The personnel in charge of uprooting the knotweed is no longer required to first transport the waste to an intermediate storage site (requiring two to three persons per truck). Consequently, more time is available for the actual management work.



9 - Situation on the plot with the compost simply spread over the ground.

10 - Situation on the plot with the compost mixed with the soil.

Information on the project

■ A study report was drafted as well as an information document, that were sent to the technical and financial partners of the Orge River Board.

■ A video was made available on the internet in November 2018.

■ A management report was published in the Bulletin n° 24 of the Forum des Marais Atlantiques in September 2020.

Outlook

■ The Orge River Board decided to continue with composting Asian knotweed in 2020. At some point, tests will be run on composting other IASs such as Himalayan balsam (*Impatiens glandulifera*).

Authors: Mathieu Gouirand, Orge river board, Madeleine Freudenreich and Clara Singh, IUCN French committee, for the Resource Centre on invasive alien species. April 2020. Editor: French Biodiversity Agency.

This management report fills out the collection already published in the second and third volumes of the book titled "Invasive alien species in aquatic environments, Practical knowledge and management insights", in the Knowledge for action series published by the French Biodiversity Agency. (<http://especes-exotiques-envahissantes.fr/best-practices-guide/?lang=en>)

For more information

■ Reports for the years 2005-2009 and 2019 drafted by the Natural environment forward-planning and studies department of the Orge River Board (AVELINE N., 2011 and LACHIZE N., 2019). (In French)

■ Internet site:

<http://www.syndicatdelorge.fr/>

■ Vidéo :

<https://www.youtube.com/watch?v=KKx7nmzzHjE>

■ LACHIZE, N. and GOUIRAND, M. 2019. Report on a composting experiment for Asian knotweed 2018-2019. Natural environment forward-planning and studies department. (In French)