



Asian knotweed

(*Reynoutria* spp.)

Experiments in using grazing to manage Japanese knotweed in the Mayenne department

Mayenne departmental council (CG 53)

■ CG 53 manages the departmental network for the management of invasive alien plants in a partnership with the departmental federation for fishing and the protection of aquatic environments.

■ CG 53 is both the owner of the *Moulin à papier* site in the sensitive natural area in the town of Saint-Calais-du-Désert and the manager of the site restoration project:

- the work was part of the management plan for the Saint-Calais sensitive natural area drawn up by the Normandie-Maine regional nature park to “manage invasive species, primarily Japanese knotweed and balsam”;
- the work was carried out in collaboration with Agrocampus Ouest (Rennes).

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Intervention site

■ The *Moulin à papier* site is a wetland upstream of the Mayenne River, in the Saint-Calais-du-Désert sensitive natural area. The experiments were conducted on several colonised sites within the former poplar grove:

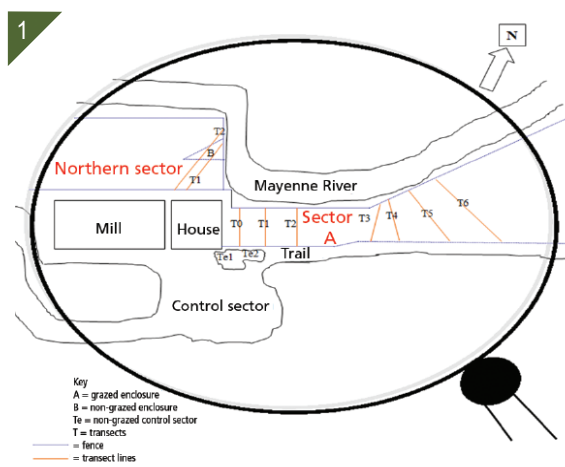
- sector A, a grazed area in an enclosure measuring 11 352 square metres;
- northern sector, that consists of an enclosure (grazed) and an enclosure (not grazed);
- control sector, located to the south of the house, not grazed and divided into two parts. Te.1 is the non-grazed control sector for transects T1 to T6 in sector A and Te.2 is the non-grazed and tarped control sector for transect T0 in sector A.

■ The initial experiments concerning *Reynoutria japonica* on this site (mowing and burning of the plants) took place in 2009.

■ In 2010, mowing followed by tarping was experimented and the first assessments concerning surface areas and biomass quantities were conducted.



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1. Study site.
2. Diagram of the Moulin à papier experimental site.

■ At the end of 2010, it was decided to try another management method in 2011, namely using goats to consume the knotweed.

Disturbances and issues involved

■ The presence of *Reynoutria japonica* was observed for the first time on the *Moulin à papier* site between 2005 and 2007, and confirmed in 2008 during the examination done in the framework of the site management plan drafted by the Normandie-Maine regional nature park.



- The former poplar grove was colonised by *Reynoutria japonica* following a logging operation that disseminated the rhizomes of the initial population that was planted by the miller to enhance the landscape. In 2011, three colonies measuring 60, 200 and 1 500 square metres were noted.

- CG 53 set up experiments on how to manage *Reynoutria japonica* and the impacts of its colonisation.

■ Ecological impacts

- Long-term damage to rivers banks due to erosion.
- A reduction in the number of native plant species due to competition with *Reynoutria japonica* for nutrients and light (with a general closing in of the environment).

■ Impacts on land use

- The plants are a hindrance for fishing, hunting, etc.
- Management of *Reynoutria japonica* was set up in the framework of the restoration policy for the wetland.

Interventions

- Since 2009, CG 53 has worked to restore the wetland while limiting the propagation of the knotweed and progressively reducing the stands. The unsatisfactory results produced by the management techniques employed in 2009 and 2010 led to the decision to use goats in 2011. Agrocampus Ouest was selected to monitor the effectiveness of the technique.

■ Grazing as a management method

- On 13 July 2011, the day they were weaned (except for two or three animals already one year old), 13 male, domestic goats (*Capra aegagrus hircus*) were brought to the site:

- reproduction was not an issue;
- the species was suited to underbrush with regrowth of woody plants.
- The animals were present the entire year on the site.
- A local, retired person checked the animals daily for a fee.
- The pen, approximately one hectare in size (10 000 square metres), was set up and maintained by the *Études et Chantiers* social reintegration association.
- A rotary cutter was used to mow or create passages inside the pen from July to September in order to provide the animals with paths and more accessible land.
- The trees in the pen were protected against stripping of the bark by the animals.

■ Scientific monitoring

- Monitoring was conducted in 2011 using quadrants (biomass samples) and a set of transects for plant inventories during three periods, two prior to grazing in June and July and one during grazing at the end of September. The observations and measurements were made in all the sectors, including the two control sectors Te. 1 et Te.2 (R = with *Reynoutria*) that were not grazed.

- Plant inventories:

- the study areas were quadrants (2 m x 2 m) positioned along the transects in areas with *Reynoutria* (R) and in others without (S). Each transect received two quadrants, 1 R and 1 S;
- each quadrant was photographed and geolocated (GPS).



3. Control sector colonised by *Reynoutria japonica*.
4. 5. Domestic goats (*Capra aegagrus hircus*).

Table of the observations and measurements.

Data registered	Variables
Complete list of plants	Taxonomic richness (number)
	Plant frequency
% surface area of each species	% surface area of all plants
Max. height of each species (measured)	Max. height of each species (average)
Measured height of each knotweed stalk [x measurements per quadrant]	Average height of each knotweed stalk [1 value per quadrant]
Height of water during flooding [5 values per quadrant]	Average height of water during flooding [1 value per quadrant]
Total fresh and dry plant biomass (knotweed and other species) in each type of quadrant (R, S)	Average fresh and dry plant biomass (knotweed and other species) in each type of quadrant (R, S)



6. Collecting a biomass sample.

■ Biomass samples:

- the sampled area is a smaller 0.25 square metre quadrant (0.5 m x 0.5 m) in each 4 square metre quadrant;
- the same plant inventories were carried out;
- using a spade but without taking too much soil, samples were taken of the aerial and below-ground parts of all the plants in the quadrant;
- each quadrant was photographed and geolocated (GPS);
- the samples were collected in a black, garbage bag and labelled. For samples from areas with knotweed (R), the knotweed plants were separated from the other plants (two bags);
- the bags were individually weighed (fresh weight) shortly after the samples were taken, then stored flat on the floor of a cool, dark place (a closed garage at Agrocampus Ouest);
- the biomass was dried in the open bags for 7 to 8 months at ambient temperature prior to each bag being individually weighed (dry weight).

■ Additional observations on the site noted the consumption (browsing) of the vegetation and the knotweed, including the presence, abundance and freshness of faeces.

Results and assessment

■ Results

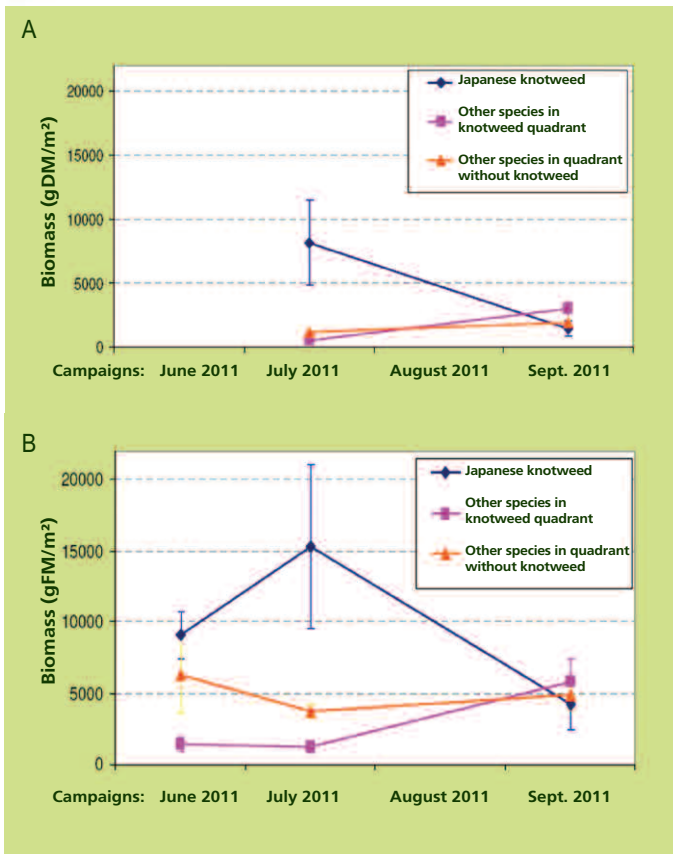
■ The impact of *Reynoutria japonica* on the other species was confirmed prior to grazing:

- there was 3 to 4 times less fresh biomass of the other species in the quadrants with *Reynoutria japonica* than in those without;
- the number of species, their abundance and surface areas were inversely correlated with the abundance of *Reynoutria japonica*.

■ Grazing reduced the knotweed biomass and led to an increase in the biomass of the native species.

■ The number of native species increased from 6 to 8 before grazing to 15 during grazing. This increase was due to the fact that grazing limited the pressure exerted by the Japanese knotweed and enabled the native species to develop.





A. Average dry biomass.
B. Average fresh biomass.

■ Assessment

- Certain animals had difficulty in adapting to the environment. Two had to be removed from the site and two others died due to ectoparasites (their young age made them more susceptible to parasites).
- The animals immediately (the first day) started eating the Japanese knotweed throughout sector A.
- The use of the rotary cutter between the last two campaigns had an impact on the environment that probably modified the interpretation of the results. But did it influence the consumption of knotweed by the goats or contribute to dispersing stalk fragments and rhizomes?
- The costs incurred by this project were not available.

○ Outlook

- Management of *Reynoutria japonica* by grazing will be pursued and monitored.

Information on the project

- The work was presented during the national symposium on Asian knotweed held on 23 and 24 October 2012 in the city of Saint-Étienne.

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7. Grazed area at the end of September 2011.
8. Comparison between a control zone (left) and a grazed area (right) in 2012.

For more information

- Haury J., Moreau C., Bozec M., Druel A., Paulet Y., Cabral T. 2012. Expérimentation de gestion raisonnée de la Renouée du Japon (*Reynoutria japonica*) sur le site du « Moulin à papier », à Saint-Calais du Désert (53). Synthèse d'intervention 2011 et rappel des résultats 2010. Agrocampus Ouest site de Rennes, Dreal Pays de la Loire et Conseil général de la Mayenne. 48 pp.
- Bozec M. 2013. Précisions sur le protocole élaboré par AgroCampus Rennes pour le suivi du pâturage des renouées par les chèvres des fossés, CG53, Moulin à Papier, St Calais du désert. 1 pp.