Japanese Knotweed

Ecology and Evidence.

Dr Dan Jones

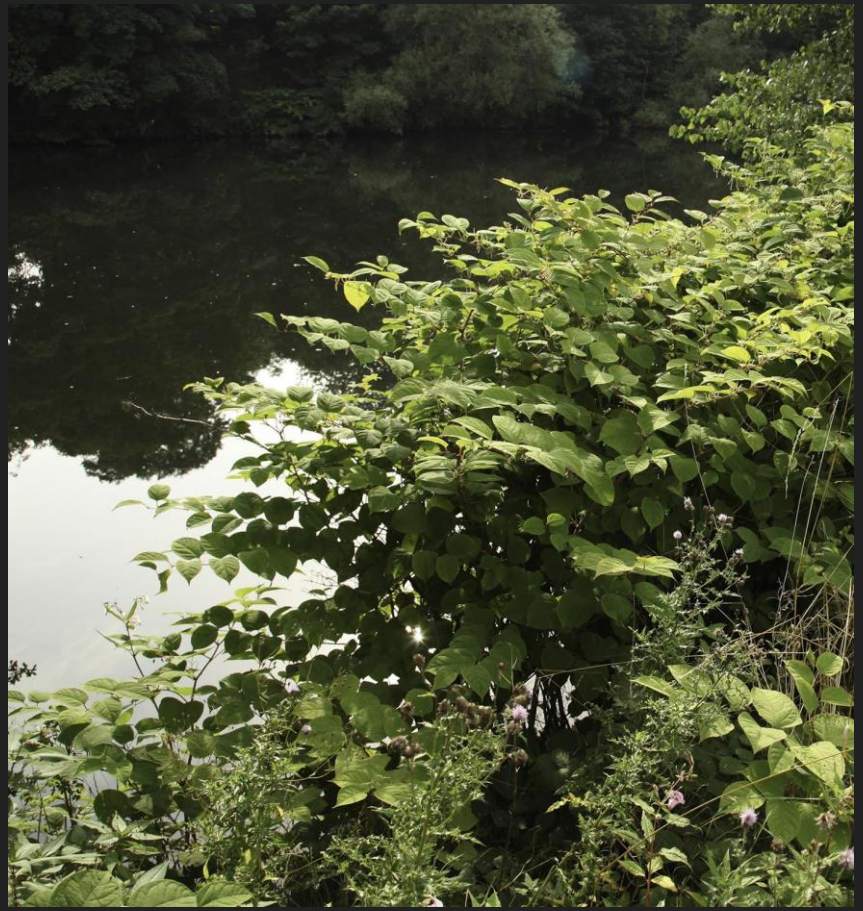
Japanese knotweed
Fallopia japonica var. japonica

Dwarf knotweed
F. japonica var. compacta

Giant knotweed
F. sachalinensis

Bohemian knotweed
F. × bohemica

Japanese knotweed *s.l.*
'in the broad sense'



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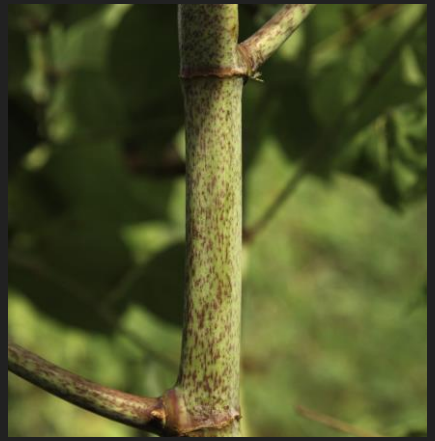

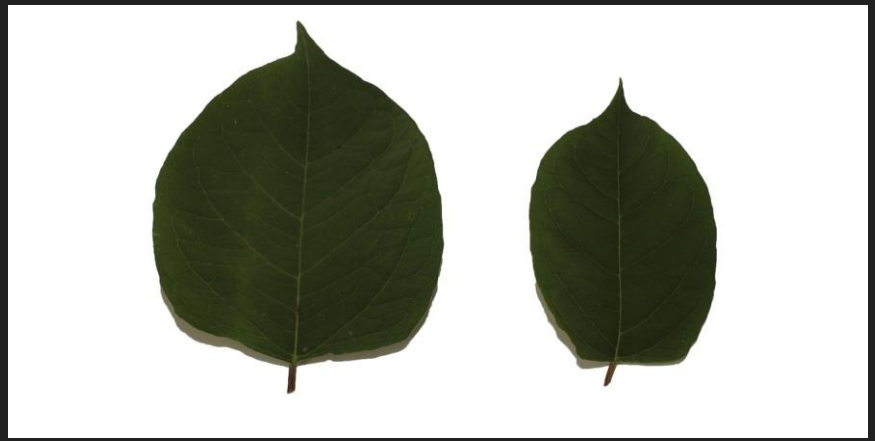

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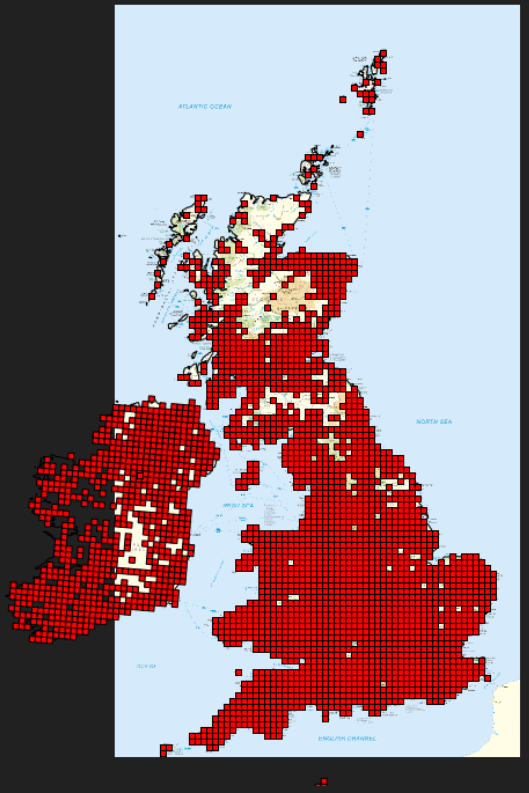
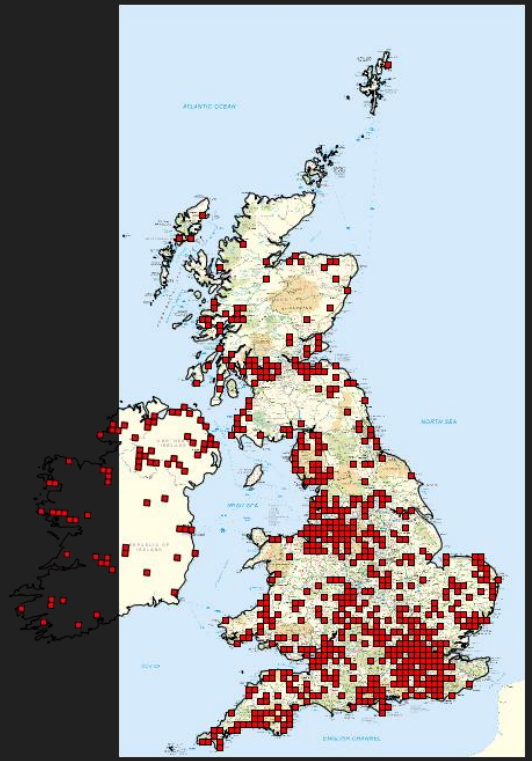
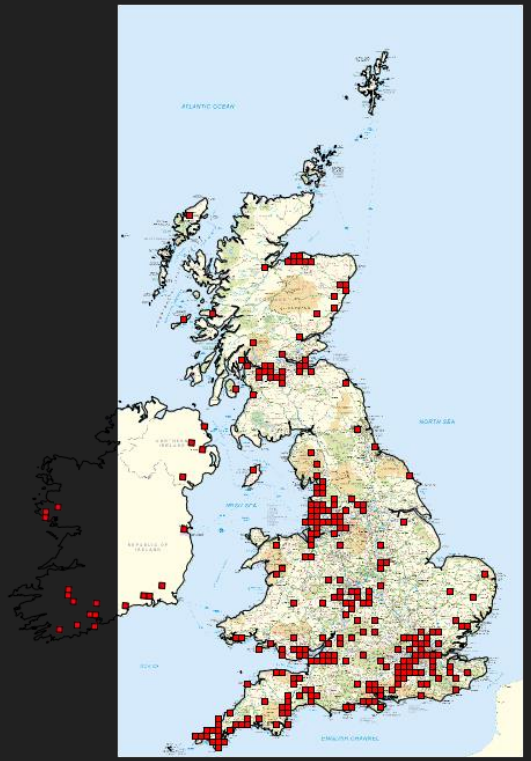


Japanese knotweed
Fallopia japonica var. japonica



Giant knotweed
F. sachalinensis



Bohemian knotweed
F. × bohemica

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Government & Industry
Env. Agency 2006
RICS 2012
PCA 2014

Academic
Child & Wade 2000
Swansea / CWC 2018
Leeds / AECOM 2018

Contractor
Case studies
Customer feedback
INNSA 2018

Method	Desired effect	Timing	Frequency
Cutting, using strimmer (1, 2 & 3), mower (3 & 4) and thrasher (2); grazing may be applicable	1. Removal of dead stems	1. Autumn/winter	1. Annually
	2. Reducing plant height prior to chemical treatment	2. March - August (allow plants to re-grow to 0.5-1.0 m before herbicide application)	2. As required
	3. Reducing vigour of plant	3. March - October	3. Four times a year
	4. Prevent spread of Japanese Knotweed *s.l.* taxa	4. Throughout the growing season (March - October)	4. In case of mowing, repeat fortnightly and allow livestock to graze throughout growing season, prior to stocking
Pulling	• Removal of individual stems of Japanese Knotweed *s.l.* taxa	• All year	• As shoots emerge
Covering (1), barrier membranes (2) and encapsulation (3)	1. Covering of knotweed using a geotextile is intended to smother knotweed, depleting energy resources and causing death	1. All year	1. Requires cover to be maintained for at least one growing season
	2. Barrier membranes involves laying geotextiles to minimise/ prevent lateral spread of rhizome	2. Permanent	2. Permanent
	3. Encapsulation involves burial of infective material within a geotextile barrier, preventing knotweed regrowth	3. Permanent	3. Permanent
Burning	1. Reduce total biomass 2. Reduce knotweed tissue viability	• All year	• Once before burial
Digging	1. Elimination of Japanese Knotweed *s.l.* taxa	1. All year, preferably spring and summer	1. Once, if carried out correctly
	2. Disturb rhizome, promoting growth and susceptibility to chemical control	2. During late autumn/winter or early in growing season (March - October)	2. Annually, as required

Herbicide	Affects grasses?	Time of application	Approved for use in or near water?	Persistency
Glyphosate	Yes	May-October (late season preferable)	Yes (certain formulations)	Non-persistent
2,4-D amine	No	May-October (late season preferable)	No	≤4 weeks
Triclopyr	No	May-October (late season preferable)	No	≤6 weeks
Picloram	No	All year (soil treatment in winter)	No	≤2 years

Scale
Residential v Strategic

Duration
Single-year v Multi-year

Information
Anecdotal v Systematic

Anecdotal data + Limited guidance = Industry folklore

Biological Invasions
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Optimising physiochemical control of invasive Japanese knotweed

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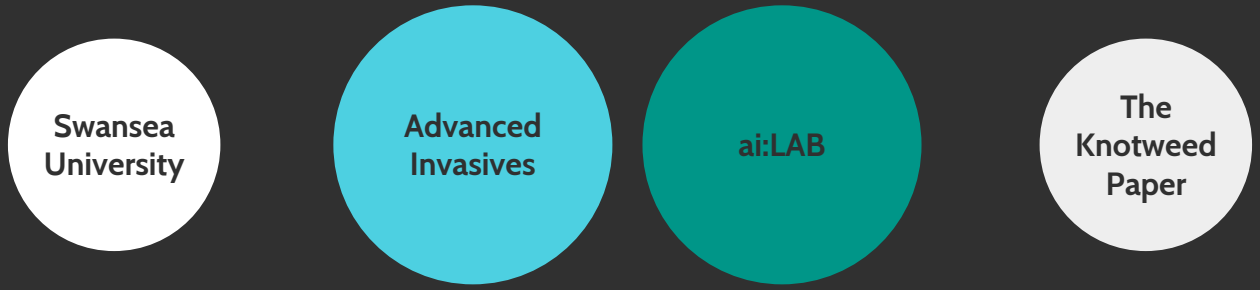

PhD field-trial

Consulting

Research

Evidence-base

2011-2016

2016-onwards

2018

We solve invasive species problems

Strategy
Research & Testing
Public Guidance
Risk Mapping
Site Survey
Expert Witness

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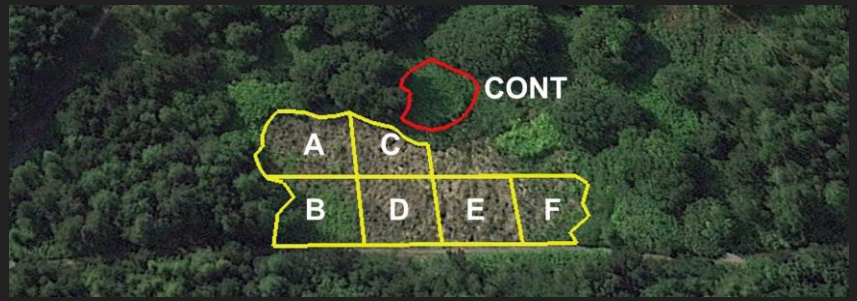

Secondary Sites

Lower Swansea Valley Woods: rhizome tillage w. herbicide
Swansea Vale Nature Reserve: covering with hand-pulling

Main Site

Taffs Well: herbicide only, and herbicide with cutting

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4
treatment types

12
acre main field site in Taffs Well

19
experiments in triplicate, with controls

58
treatment plots in total

225
metre squared plot areas

348
randomised sampling plots

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Invasives require parsimony

Key ideas

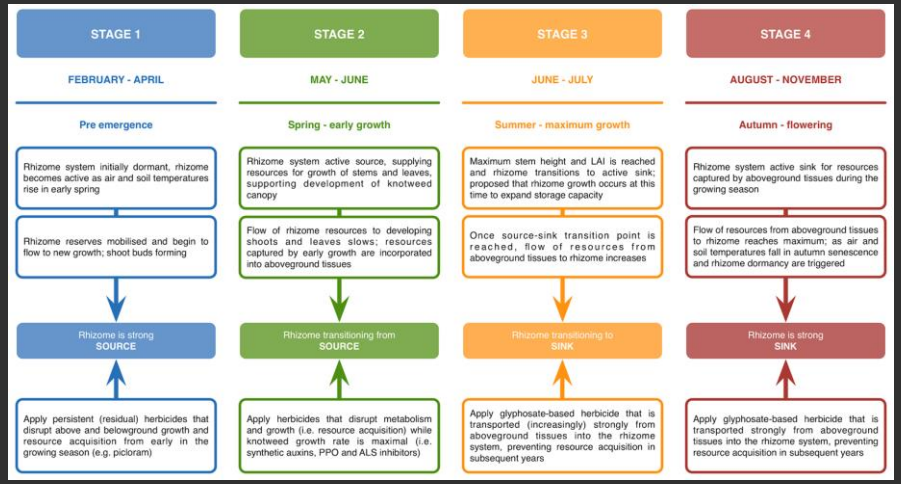
Right herbicide, right time
Need to consider seasonal energy flows between aboveground foliage and belowground rhizome

Foliage as the pump, rhizome as the battery
Treatments that damage knotweed aboveground growth jeopardise treatment efficacy

Integrated physical and chemical treatments have poor outcomes
We need to use herbicides!

Control, not eradication
No treatment achieved total kill

The 4-Stage Model™



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What works?

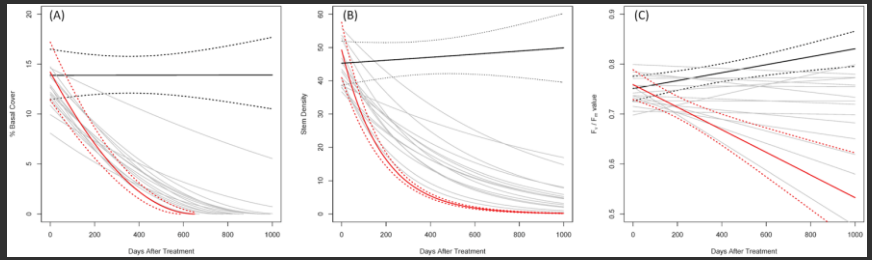
Of the 19 treatments tested only 3 were statistically effective:

- Biannual foliar spray (glyphosate)
- Stem injection (glyphosate)
- Annual foliar spray (glyphosate)

Stem injection is dose inefficient (at present!)
Requires 15.84 x dose of glyphosate compared to foliar spraying

More is not better
Beyond a threshold dose, higher dose +/- more glyphosate treatments do not improve outcomes

We need glyphosate!



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Seasonal window

Glyphosate

Translocation

Threshold

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Thank you