

# Cut and inject herbicide control of Japanese knotweed *Fallopia japonica* in Cornwall, England

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## SUMMARY

Trials at sites infested with the highly invasive Japanese knotweed *Fallopia japonica*, in southwest England, demonstrated that a cut and inject method of herbicide application is an effective way of controlling the plant. Although not matching the kill of the more commonly used method of foliar spraying, it did allow very selective application. Thus the cut and inject method can effectively avoid damage to non-target species and allows herbicidal treatment near watercourses where foliar spraying may not be permitted.

## BACKGROUND

Japanese knotweed *Fallopia japonica*, introduced to the UK from Japan in about 1850, is now Britain's most pernicious introduced weed. It has spread from gardens through fly tipping and vegetative propagation, and in some areas has formed dense, tall, extensive stands. It has been recorded in over 2,800 sites in the county of Cornwall in southwest England, and on several National Trust properties it is considered to represent a significant problem.

For some years Japanese knotweed had been controlled with some success by means of foliar spray. There are, however, a number of concerns about the impact of foliar spraying, most notably due to detrimental effects on surrounding vegetation, particularly in gardens with rare and expensive plants and on sites of high nature conservation value. Foliar spraying also requires two visits to the site (as two herbicide applications are necessary), it can rapidly denude steep banks of vegetation thus causing instability and erosion, and this technique can worry local people.

With these points in mind, the National Trust in Cornwall approached the County Environmental Trust LTD for landfill tax credit to investigate a new methodology for the control of knotweed. In 1999, a 50 per cent grant was provided to allow a three-year programme of knotweed research and management. The National Trust commissioned a research report from

Camborne School of Mines, University of Exeter, UK (Eileen 2002). An experimental licence was granted from the Department of the Environment, Food and Rural Affairs (DEFRA), Pesticide Safety Directorate.

The research looked at a new way of controlling knotweed using a cut and injection method of herbicide application, which entailed directly injecting herbicide into the hollow stem. The work compared a variety of herbicides known to have been successful in controlling knotweed using the traditional foliar spray methods. It looked at the optimum concentration, timing and application technique. It also investigated the effect on the surrounding ground flora and woody shrubs and trees.

## ACTION

**Study sites:** Six sites in Cornwall (southwest England) infested with Japanese knotweed were selected as herbicide treatment trial areas. These were owned by the National Trust, or treated with agreement from neighbouring landowners, where the infestation crossed boundaries. The trial sites were:

Forrabury Common, Boscastle; Rocky Valley, Tintagel (Ford 2004); Crantock Beach; Trencrom Hill, St Ives; Kenidjack and Cot Valley, Pendeen; and Station Wood, Fowey.

Additional work outside the formal experiment was carried out at: Lanhydrock, Bodmin;

Cober Valley, Helston; Godolphin Hill, Helston; White River, Pentewan (in conjunction with the Environment Agency); and Cotehele, Calstock.

**Cutting:** In August to late September, the knotweed was cut immediately below the first node (approximately 8-15 cm above ground level) using a pair of loppers; some operators prefer to cut just above the node and perforate the septum with a sharp instrument - there appear to be no difference between the effectiveness of the methods. The cut stems and leaves were usually stacked on polythene to prevent propagation (as new plants may arise even from small stem fragments scattered on the ground), allowed to dry and burned.

**Herbicide injection:** A glyphosate (Round-up Pro-biactive) mixture, ten times greater than the foliar spray recommendation i.e. 5:1 instead of 50:1, was injected into the hollow stem using a spot gun applicator. The solution was coloured with dyes to enable identification of treated stems. Additional to Round-up Pro-biactive, other chemicals considered potentially effective and tested at various concentrations were:

Dormone 2,4 D Amine (2,4 D Amine), Garlon 4 (Triclopyr), Tordon 22K (Picloram), Reglone (Diquat), Arsenal (Imazapyr) and Asulox (Sodium Salt of Asulam).

Only Glyphosate, Diquat and 2,4D Amine are licensed to use near water courses, where many of the infestations occur. Picloram and Imazapyr can be persistent and damage neighbouring trees and broad-leaved herbs.

**Licensing:** The work was carried out under licence from the Pesticides and Safety Directorate and those wishing to follow the 'cut and inject' methodology would need to acquire off-label approval and wear essential protective clothing when applying the herbicide.

## CONSEQUENCES

**Success of cut and inject method:** Initial monitoring has shown a success rate of between a 60% to 95% kill of Japanese knotweed in the treated areas. Although the cut and inject method did not match the kill of the more commonly used method of foliar spraying it did allow very selective application. Thus, unlike foliar spraying which results in damage to non-target plant species,

this was avoided. The cut and inject method also allows herbicidal treatment near watercourses where foliar spraying may not be permitted.

**Most effective herbicides:** Pro-biactive formulations of glyphosate (5 to 10 ml herbicide injected into each hollow stems) represented the best all-round herbicide for knotweed control. The only other herbicide to match glyphosate solutions was Tordon 22K (Picloram). In sites well away from water, where there are no trees, Picloram has been shown to have an excellent kill rate. It is however persistent in the environment, and with the possible detrimental impact on trees and shrubs, it may be less appropriate. It is unlikely that the cut and inject method will be given Single Off Label Approval (SOLA) for Picloram.

**Herbicide concentrations:** Very strong concentrations tended to burn rather than be translocated through the plant. The optimum concentration proved to be ten times that of the recommended foliar spray application i.e. 5:1 (manufacturers recommendation on label suggesting 50:1). Although this meant stronger concentrations than foliar spraying, because less than 10 ml was injected into each stem and a very targeted application was made, the effect was less herbicide used than the foliar spray method to treat an equivalent area.

**Conclusions:** The cut and inject method is an effective way of controlling Japanese knotweed. Although primarily designed for use in sites of high nature conservation value or in gardens, it can be used anywhere. There can be time-savings over the foliar spray method because it needs only one visit per year. Follow-up treatment will generally require spot spraying of individual re-growth as re-growing stems are too small to inject. The cut and inject method can also be used in moderately windy conditions and it will be accepted (because of its targeted application) far more readily by members of the public concerned about herbicide use.

It is important to treat all knotweed on a site. The 'edge effect' of leaving plants will cause knotweed to re-invade. The Trust works with neighbouring landowners where infestations straddle boundaries. It is also important to re-visit a site annually to tackle any re-growth.

Round-up Pro-Biactive is the most effective herbicide for most situations and is licensed to be used near water courses. Kill rates vary,

depending on soil depth and how well established the knotweed is. On some very extensive research sites in Cornwall, a 99 % reduction in knotweed has been achieved over three years (Ford 2004).

*knotweed (Fallopia japonica)*. Camborne School of Mines, University of Exeter, UK.

Ford S. (2004) Cut and inject herbicide control of Japanese Knotweed *Fallopia japonica* at Rocky Valley, Cornwall, England. *Conservation Evidence*, 1, 1-2.

#### REFERENCES

Cordrey L. & Ford S. (2000) Controlling Britain's most pernicious plant: Japanese knotweed. *Views*, 33, 21-23.

Eileen J. (2002) *Development of Good Practice for the use of the injection method of herbicide application to control Japanese*

For further information see the Japanese Knotweed Control Forum and the Cornwall County Council websites:

[www.ex.ac.uk/knotweed](http://www.ex.ac.uk/knotweed)

[www.cornwall.gov.uk/environment/knotweed/cornwall.htm](http://www.cornwall.gov.uk/environment/knotweed/cornwall.htm)

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