Please don’t mow the Japanese knotweed!

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Academic editor: Ingolf Kühn | Received 27 July 2020 | Accepted 27 July 2020 | Published 12 August 2020

Citation: Jones D, Fowler MS, Hocking S, Eastwood D (2020) Please don’t mow the Japanese knotweed!. NeoBiota 60: 19–23. https://doi.org/10.3897/neobiota.60.56935

We welcome Martin et al.’s (2020) significant contributions toward advancing understanding of Reynoutria japonica var. japonica (Japanese knotweed) clonal growth strategies and resource allocation in response to environmental heterogeneity; understanding knotweed ecophysiology is essential to inform and enhance large-scale invasive knotweed management. However, we strongly disagree that mowing should be recommended for the landscape management of invasive knotweeds on the grounds of limited efficacy, practicality and environmental and economic sustainability. To achieve the successful control and long-term management of invasive rhizome-forming plants, we should do more with less, as the evidence guides us (Jones et al. 2018).

Invasive Knotweed Management

As Martin et al. (2020) state, Japanese knotweed is very difficult to control (Child 1999; Skibo 2007; Delbart et al. 2012; Jones et al. 2018). Mature invasive knotweeds (Japanese knotweed s.l. taxa) are physically large plants (above and belowground biomass regularly exceeds several kilograms per m², respectively) with extensive belowground growth (several metres in diameter and depth; Fennell et al. 2018; Jones et al. 2018). Depth and extent of belowground biomass affect management strategy by enabling
the plant to recover from many physical, herbicide-based and integrated control treat-
ments, even when applied over relatively long time periods (>3 years; Jones et al. 2018).

While we acknowledge that mowing is a widely applied vegetation management
method for infrastructure maintenance, cutting as a management method for estab-
lished invasive knotweeds has been reported as ineffective in the medium to long-term
at a range of spatial scales throughout the academic and grey literature in Europe and
North America (Seiger 1997; Brabec and Pyšek 2000; Child and Wade 2000; Green
2003; CEH 2004; Soll 2004; Gover et al. 2005; Kabat et al. 2006; Rennocks 2007;
Skibo 2007; Bashtanova et al. 2009; Macfarlane 2011; Delbart et al. 2012), though
native species diversity may increase during active management (Adler 1993; Hartwig
and Kiviat 2009).

Historically, where cutting was proposed as a management method in the UK
and North America, it was suggested that Japanese knotweed stems were cut down
to ground level at least every 2 to 3 weeks through the growing season to deplete be-
lowground rhizomes (Child and Wade 2000; McHugh 2006; EA 2013). Yet, to our
knowledge, there are no examples of successful long-term invasive knotweed man-
age using this treatment programme, despite the application of approximately
20 cuts per year. While the 3 cuts per year proposed by Martin et al. is more eco-
nomically sustainable than 20 applications, if the more intensive programme has not
demonstrated efficacy at the field scale, it would seem unlikely that 3 cuts per year
will deplete the rhizome sufficiently to achieve short-term control, let alone effective
long-term management. Hujerová et al. (2013) and Van Evert et al. (2020) reported
that aboveground cutting of taproot-forming Rumex spp. (Docks; also members of
the Polygonaceae) three times per year did not eliminate these species from grass-
land, or result in plant death. This is despite Docks being smaller and less vigorous
than any of the invasive knotweeds. Consequently, on the grounds of treatment ef-
cacy alone, we do not recommend mowing as an effective management method for
Japanese knotweed.

Aside from limited efficacy, consideration of practicality and the risk of further
spread of Japanese knotweed in the environment should inform the application of
mowing. Accessing large swathes of invaded riparian or roadside habitat with heavy
equipment is frequently problematic, and it is crucial to ensure that stem and rhizome
fragments created by cutting methods do not result in wider dispersal of knotweed
into the environment (Sieger 1997; Child and Wade 2000; Soll 2004; McHugh 2006;
Skibo 2007; Bashtanova et al. 2009; Macfarlane 2011; Delbart et al. 2012; EA 2013,
Jones 2015). Minimising dispersal at the landscape scale is unfeasible, considering that
leaf (Brabec 1997), stem (De Waal 2001) and rhizome fragments (weighing as little as
0.06 g; McFarlane 2011) may give rise to new plants. Further, Scott (1988), Beerling
(1990) and Beerling et al. (1994) highlight direct lateral expansion of rhizome in re-
sponse to cutting, exacerbating local spread. Causing the dispersal and/or exacerbating
the spread of invasive knotweeds in the UK may be in contravention of national biodi-
versity legislation (e.g. The Wildlife and Countryside Act 1981, UK).
Parsimony as a principle for invasive plant management

There are strong environmental, ecological and economic arguments for the management of invasive alien plants (IAPs) to minimise their negative environmental and economic impacts (Pergl et al. 2020). However, limited empirical evidence underpinning the ecology and management of rhizome-forming invasive plants can lead to the application of ineffective and labour-intensive physical control treatments, and/or unnecessary/excessive herbicide use. This undermines the sustainability of long-term control programmes for these species, resulting in further spread and dispersal in the environment with no discernible management benefit (i.e. *the cure is worse than the disease*; Kettenring and Adams 2011; Jones et al. 2018; Jones and Eastwood 2019).

In short, to achieve the successful control and long-term management of invasive rhizome-forming plants, we should do more with less, as the evidence guides us (Jones et al. 2018). While we welcome Martin et al.’s significant contributions toward advancing understanding of Japanese knotweed belowground, in particular clonal growth strategies and resource allocation in response to environmental heterogeneity, we strongly disagree that mowing should be recommended for the landscape management of invasive knotweeds on the grounds of limited efficacy, practicality and environmental and economic sustainability.

Acknowledgements

This work is part-funded by the European Social Fund (ESF) through the European Union’s Convergence programme administered by the Welsh Government with Swansea University and Complete Weed Control Ltd.

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