

Plastic Tree Tube Options Report

Introduction

Since they first came onto the market in 1983, plastic tree tubes have become a widespread tool used to help landowners with woodland creation. Plastic tree tubes protect newly planted tree saplings against browsing pressure from sheep, rabbits and other small mammals such as voles. Tubes of 1.2m or higher can protect against browsing roe deer and those 1.5m will protect against red or fallow deer. They also provide a sheltered microclimate in which young saplings can establish themselves more quickly than without. According to tree guard manufacturers Tubex- these combined benefits can result in a 25% higher survival rate in the first year and trees which are much taller after 5 years.

The widespread adoption of tree tubes has led to problems arising at the end of their lifetime- many are lost and blown away before safe disposal can take place, or simply not collected at all. As a result, they are a major source of plastic waste in rural areas. As the environmental consequences of single use plastics are becoming more prominent in the public consciousness, it is timely that the use and disposal of tree guards came under scrutiny. In light of this, several reports and guidance notes have recently been produced which confront this issue (e.g. Forestry Commission, 2020; Yorkshire Dales Millennium Trust, 2019). This report aims to build on existing knowledge and apply it to the Fellfoot Forward Landscape Partnership area within the North Pennines AONB. This has been made possible by the contributions of several land managers working across the area whose experiences are recorded here.

From our research and correspondence with partners, four options have been identified which address the issue of plastic waste from tree guards. These include:

- Avoiding tree guards
- Alternatives to plastic
- Reusing tree guards
- Removal and recycling

The benefits and drawbacks of each of these options, along with their viability in the Fellfoot Forward area will be assessed.

Avoiding plastic guards

There are benefits to avoiding plastic tree guards beyond simply avoiding plastic waste. Woodland which has naturally regenerated has been shown to sequester more carbon than that which has been planted (Tasmin & Fletcher et al 2021). In addition, a local seed source will be more resilient to the soil and climatic conditions particular to the site. Natural regeneration however will only be a viable option on sites where there is already mature woodland nearby to regenerate from. Another crucial limiting factor is the time it takes to establish new woodland through natural regeneration, which is much greater than planting.

Whether promoting natural regeneration or planting without tree guards. It is important to determine what animal species are present which have the potential to cause browsing damage. The most significant pests to sapling growth are sheep, deer, rabbits and voles. Making use of the Cumbria Biodiversity Centre's Mammal Atlas (CBDC, 2017) would be a useful preliminary assessment

to determine if rabbits and voles are present around the proposed planting site, but this would need to be followed up with an on the ground survey.

Another factor to consider is the species of tree being planted. The Eden Rivers Trust have determined that when rabbit and vole populations are low, tree guards are not required for hawthorn or blackthorn. However, this must be reviewed on a case-by-case basis, as other factors such as high precipitation and high winds may necessitate the use of tree guards for their sheltering function.

If populations of small mammals are insufficient to warrant the use of plastic tree guards but browsing from sheep and deer still needs to be protected against, fencing can be used as an alternative to plastic tubes. However, the size and shape of the proposed planting site are important considerations as fences are time consuming and costly to install. Therefore a simple, large planting site with few turns will be more cost effective than fencing several complex shaped areas. In the case of establishing wood pasture on grazed land for example, this method would prove ineffective. If deer populations are significant in the planting area and tree tubes are not present, then deer fencing should be installed- which significantly increases the cost.

Cryptic planting may offer a potential plastic free solution in some areas. Disguising a target species of tree with more unpalatable species can deter browsing from mammals. An example of this could be planting hawthorn around oak. It is relatively low cost- however, this is not a widely adapted strategy so its effectiveness is as of yet unknown. The risk of lower survival rate to plastic tree tubes is likely (Moser & Greet, 2018).

Alternatives to plastic guards

A few alternatives to plastic tree guards have emerged on the market in recent years. These include biodegradable [cardboard](#) and [sheep's wool](#) alternatives. The outlook for these products is promising but as they have not been tested over significant timescales, there is a lack of confidence among landowners with regards to their effectiveness, and the cost of a biodegradable tree guard is at present higher than that of a plastic one. In addition, current countryside stewardship schemes stipulate that tree guards must be left in situ for 10 years- while biodegradable tree guards are mostly designed to degrade after 5 years. Biodegradable tree guards will become more prominent in the future, but they are not yet an effective alternative and tubes from some brands must still be collected and sent to industrial composting facilities. A summary of products currently available or soon to be available for plastic alternatives is provided below.

All hyperlinks and prices correct as of 29/06/2021

Brand	Material	Price	Disposal method	Lifespan in-situ	Notes
Tubex Nature Tree shelter	Not known	On request	Compostable in industrial facilities	5 years	Product still in testing – expected release autumn 2021
NexGen	Sheep wool	Not yet released	Biodegradable	5 years	Product will launch in summer 2022
Treebio by Green Tech	Polylactic acid	From £0.51 - £2.00 per guard	Compostable in industrial facilities	4-5 years	After UV degradation breaks down the material in-situ it is classified as a biodegradable product
Bioearth by Green Tech	Cardboard	£1.65	Biodegradable - will disintegrate in ground	3 years	Does NOT need to be collected for disposal
Cactus Guard via Westmorland Woodfuel	Metal	£5.70 - £18	Manual removal – able to re-use as long as remains undamaged	Not stated	Most applicable for standard trees in a wood pasture setting, protects against damage from sheep and cattle
BIOTUBE by Biocycle	Biodegradable resin	Not yet released	Claims to be 100% biodegradable	Not stated	Product to be released imminently, no cable ties needed
WhiptecBio by Ezee Tree	Recycled, plant based materials	From £0.36	100% biodegradable – can be left	2-4 years	No need for cable ties, newer product about to be released

The Woodland Trust are currently undertaking [research](#) into plastic free alternatives to tree tubes at Avoncliff wood, near Bath. With over 20 different types of tree guard being trialled, the findings of this research will give an insight into the long-term effectiveness of plastic free tree guards. However, the setting of this experiment is different to the Fellfoot Forward project area, where a shorter growing season and more hostile conditions will result in slower growth rates.

Removal options

For both reusing and recycling tree guards the logistics of removing tree guards from the site needs to be considered. Land managers surveyed for this report generally noted that it was the land managers themselves who were responsible for collecting used tree guards. Collecting tree guards could be a task for volunteers but it is worth noting it can be a boring and repetitive task and may discourage people from coming back to volunteer again. Contractors can be brought in to complete the task and approximate costs could be between £130 - £150 per person per day (B. Scotting, Personal Correspondence, 21 May 2021). If removing tree guards were to happen on such a scale that it would be beyond the scope of what is achievable by the land manager, then contractors would be the next best option.

Reusing Options

Tree tubes can occasionally be reused, but this is usually not possible as they can either become brittle and ineffective or split along the seam as the tree grows. In an upland setting, where growth rates can be much slower, tree guards may have to be left in for longer, and therefore it is less likely that they can be used a second time. The other consideration with reusing tree guards is that this is a labour-intensive option, requiring double the man-hours to re install them after removal. Therefore, reusing tree guards is only likely to be effective on small scale planting projects.

Recycling options

Three companies within the Fellfoot Forward area were identified as being able to recycle tree tubes. These include Tubex, Brampton skip hire and Solway recycling.

Solway recycling, based in Dumfries, offer competitive rates and collection services as well as drop off points at specific dates located throughout Cumbria (<https://www.solwayrecycling.co.uk/recycling-services/collection-hubs>). For small scale planting schemes or more remote sites a drop-off arrangement would be effective as there is less of a minimum order requirement. The cost of recycling tree guards with Solway dependent on a market which often fluctuates- therefore it is difficult to predict the cost for recycling when trees are being planted. Current rates (correct as of 02/06/2021) are £160 a tonne.

Brampton skips, based in Carlisle, offer a flat rate of £250 per skip for skips of various sizes, with an increase in cost based on mileage. This price is more consistent than that of Solway, however a large amount of tree tubes would be needed in order to make this cost effective. Being located in Carlisle, collection costs would be less than those of Solway, however this cost would increase with distance. Brampton skips are also able to accept loads which have been dropped off at the centre for smaller quantities.

The Tubex recycling scheme will only recycle its own brand of tree guards and needs a significant minimum amount to be collected in order to justify a pick-up from a site. Details for each company's recycling options are in the table below.

Summary of the recycling services for tree tubes offered in the Fellfoot Forward area

Company	Location	Services	Rates	Minimum requirement	Offer drop off services?	Limitations
Tubex	Trees Please, Corbridge, Northumberland	Collection by Tubex then sent to local distributor	Bespoke, on a not-for-profit basis to cover costs £60 for 10 bulk bags	12 bulk bags, each bag holds approx. 350 tree tubes. 4200 tree tubes minimum	No	Only for Tubex brand tree guards. Required to use Tubex brand bulk bags
Brampton Skip Hire	Carlisle, Cumbria	Skip hire and drop off	£250 per skip + mileage	No	Yes – in Carlisle	Large amount of tree tubes needed to be cost effective with skip hire
Solway Recycling	Dumfries, Dumfries and Galloway	Collection and drop off	Dependent on market - £160 a tonne as of 02/06/21	No	Yes – drop off available at different locations throughout Cumbria on specific dates (check website for up to date details)	Large amount needed to be cost effective unless using a drop off point
Agricycle	Lincoln	Collection	£45 per bulk bag	No	Yes, in Lincoln	Only collect recyclable materials eg tubex

Practices in other organisations

All the organisation contacted use plastic tree tubes in some form, although there are instances where it is possible to avoid their use. (Natural England, North Pennines AONB, RSPB and Eden Rivers Trust [ERT]). In the North Pennines AONB Partnership, land managers are advised that while tree shelters are appropriate in many cases, their use can be avoided. Woodland expansion work at High Helbeck for example has been progressing without the use of tree guards for thorny species and willow pegs. Early indications suggest that this approach has been successful and will be advocated for future planting projects in the AONB. The RSPB use tree tubes as deer fencing is not an option at Geltsdale, these tree guards are usually over 1.5m tall to prevent being stunted by deer browsing. They have also used starch tube alternatives, but this affected their Countryside Stewardship payments (S. Westerberg, pers comm.). ERT have stopped using tree tubes on hawthorn and blackthorn unless there is a high population of rabbits and voles or if there is a risk of high wind and snow. They have also tried compostable guards with poor results (H. Clarke, pers comm).

Discussion

When deciding which strategy to consider when establishing trees, the three most important factors to consider are scale, site and tree species. The issue of scale perhaps impacts most on a landowner's decisions, as this will affect the viability of fencing, reuse and recycling. A large-scale site may make the economics of recycling more viable, due to the ability to place bulk orders at recycling centres. However, the workload of collecting used tree guards on a large-scale project is demanding.

Tree species and site are the two largest factors determining whether tree guards are necessary or not. Site determines the browsing pressure present, growing conditions and feasibility of collecting used tubes for recycling. Tree guards are less essential for example on a site with low browsing pressure and favourable growing conditions. Species such as hawthorn may not require tree guards if pressure from rabbits and voles is low and can be used to protect more palatable species.

Tree tubes provide an environment up to 6^oc warmer than the surrounding areas (Close et al., 2009). This can promote fast growth of seedlings but this compromises its lateral growth and stem thickness (Lai & Wong, 2005). Published research on tree guards is lacking, and what is published has a global reach so results may not be directly translatable to the climate of the North Pennines AONB. Some research claims that survival is not influenced by the presence of tree guards but height is. In Sitka spruce, the safe growth height was only 1 season quicker than unprotected trees (Welch et al., 1992).

Rural policy is currently undergoing major changes as we shift from Countryside Stewardship (CS) and Basic Payment Schemes to Environmental Land Management (ELM). While historically Countryside Stewardship took a prescriptive approach, stipulating that plastic guards must be used and left on for 10 years, DEFRA have indicated that a more outcomes-based approach will be taken in the future. Therefore landowners will have more freedom to choose how to achieve the aims set out in their agreements. This could leave scope to experimenting with alternatives to plastic tree guards.

In the North Pennines, the Farming in Protected Landscapes (FiPL) project offers funding for capital works which include tree planting. As the funding is administered by the AONB partnership, there is

more scope for different approaches to CS prescriptions to be taken. The [England Woodland Creation Offer](#) (EWCO), administered by the Forestry Commission, is able to fund larger scale planting projects. The England Woodland Creation Offer states that tree guards are not needed in some circumstances. As EWCO agreements are facilitated by Forestry Commission advisors, their expertise will be useful in determining the best option for each site.

Another important factor for woodland creation success is the importance of maintenance once the trees are in the ground. Long-term plans for woodland management are crucial to the survival rate of the trees planted. A management plan for maintenance with the landowner needs to be agreed, ideally in the development period of the woodland creation. This should include replacing failed saplings and empty tubes and ensuring the stakes are secured each year. The maintenance grant component of EWCO lasts for 10 years and has the following stipulations (Forestry Commission, 2021):

- keep all newly planted trees free from competing vegetation for 10 years by using approved herbicides, mulch, or a clearing saw, hook or scythe
- replace any trees that die
- maintain fences, tree shelters or spiral guards
- maintain areas of open space
- remove individual tree protection in year 10

For these stipulations to be upheld, regular inspection from grant officers needs to take place. It remains to be seen whether the facilities exist to provision this for everyone participating in the scheme.

Conclusions

To see an effective return on the investment of planting trees, either financially through rural payments and grants or through ecosystem services provided, a high tree survival rate is required. As tree guards are a well-established way of ensuring this, it is likely that they will continue to be used. This means that the collection and recycling of tree guards remains at the heart of the issue of dealing with plastic waste in tree establishment. Within the Fellfoot Forward area there are some good options for recycling; it is a question of scale which determines the logistics of getting used tubes to the recycling centre. Changes in rural payments may allow for an increased uptake of biodegradable tubes. This would provide a less labour and energy intensive alternative- especially as plastic alternatives continue to improve.

Therefore we endorse the following recommendations when planning to use tree tubes:

1. Tree saplings will do best when protected by a tree tube, but the removal and disposal of tree tubes need to be built into and budgeted for in the planning stage of woodland creation
2. Plastic tree tubes remain the best option for large scale woodland creation in exposed upland areas such as the North Pennines
3. Small scale tree planting in areas with little small mammal predation will benefit from the use of cactus guards, which protect from large browsers, are extremely durable and can be reused.
4. Only plastic guards and cactus guards currently meet countryside stewardship requirements to stay in place for 10 years

5. Plastic alternative tree guards pose a realistic alternative in future woodland creation. The next 5-10 years will show just how effective these alternatives are in-situ. Testing of these new options needs to begin real scenarios where they are not tied into Countryside Stewardship Schemes
6. Not all plastic-alternative tree tubes are made equal. Some will only biodegrade in industrial facilities, some will biodegrade in-situ
7. Recycling and disposal options exist on different scales to suit the needs of different projects.

Acknowledgments

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