Mechanised Cutting Production at Notcutts Nurseries©

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INTRODUCTION

Traditionally most cuttings were made with a node at the base and were cut neatly above a leaf joint, i.e., a nodal cutting. However there were exceptions. *Clematis* and *Hedera* have for many years been propagated as internodal cuttings. When I first joined Notcutts Nurseries Propagation Department, as assistant to propagator Ivan Dickings, he set me the task of trialling various taxa of plants as internodal or internodal length cuttings. An internodal length cutting is the term used to describe a cutting that has been cut anywhere on the stem whether it be below or above a node. Examples of these were *Potentilla, Spiraea, Escallonia,* and *Lavandula*. We found that wherever they were cut, they still rooted regardless, because these plants all had relatively close leaf joints and when inserted there was always a node in the compost. It was also found that plants with long internodes, such as, *Buddleja* and *Cornus,* could be propagated as internodal cuttings, creating a plant which had breaks coming from much closer to the base of the plant.

It was a few years after this that we discovered that a company in Germany, called Jansen Engineering, was marketing a machine called the Jansen Plant Cut, which takes cuttings by topping and tailing cutting material as it is passed through. Given the results from those earlier trials described above this appeared to offer a method for mechanising production of internodal and internodal length cuttings. We arranged for a demonstration model to be brought over and from what we saw we were confident that we could use this machine successfully in our production programme.

MACHINE DESIGN AND OPERATION

Operating Principle. The basic design of the machine is that there are four rubber belts, two upper and two lower. The cuttings are held by being pinched top and bottom between the belts. The distance between the sets of belts can be varied from 40 mm to 150 mm to vary the length of the cuttings. Adjacent to the belts are two rotating Teflon coated stainless steel blades each of which runs against a smaller, stationary blade. The operator offers the material into the centre of the rubber belts; the belts hold the material and move it through to the blades. As the material passes through it is cut at both ends by the blades. The cuttings continue on until the belts drop them into a collection bin. The machine will cut material up to 6 mm in diameter. There is a counter to record the number of cuttings passing through. The motor is powered by a single-phase electric supply and the machine weighs 70 kg.

Health and Safety. The machine has fast moving blades and belts. The cutting area needs to be covered at all times while the machine is in operation. People with long hair should have it tied back to prevent it becoming trapped in the belts and all operators should familiarise themselves with the machine before using it. Daily maintenance includes removal of any plant material from inside the machine and wiping the blades clean. We use a spray of alcohol and a soft cloth to do this.

EXPERIENCES OF THE MACHINE IN USE

Successes and Failures. To date we have tried approximately 50 different genera. Most of these have been successful, some have had limited success and for those we have switched back to hand propagation. Some other taxa can be cut mechanically but it wastes too much material—cutting by hand results in more cuttings from the material available. Successful crops include *Potentilla, Spiraea, Ligustrum ovalifolium, Cotoneaster, Lonicera nitida, Escallonia, Euonymus, Lavandula, Santolina,* and conifers.

Crops which we have tried but with which we have struggled to get good results are *Deutzia, Philadelphus,* and *Kolkwitzia*. We are not quite sure why this is, as we can grow them successfully as internodal cuttings. It may be an effect arising from their particularly long internodes. When they are cut through the machine they can be left with long bare stems with two leaves at the base. Having this bare stem could be a seat of infection but there are probably other factors causing failure.

Crops which we have tried and are successful but which result in a lot of wasted material include *Forsythia, Abelia, Buddleja, Choisya, Cornus, Hypericum, Perovskia, Viburnum,* and *Weigela*.

Work Rate. The machine has the potential to produce 2000 cuttings per hour but this rate varies depending on a number of factors. First, there is the presentation of the material. If cuttings are presented to the operator in a uniform fashion—i.e., all facing the same way and in small bundles, then the operator can pick out a bundle from the container, place it in front of the belts and pass them through the machine at speed. However, this slows down the collection of cuttings with the collectors having to take the machine operator into account. To speed up the collection operation we collect as many cuttings as possible by hedge trimmer and bag them up. This means that when the material arrives at the machine it generally has to be sorted as it passes through the machine. This ultimately slows down the operator and we are looking at a rate of 1500 h^{-1} by this method.

Second, the length of cutting material affects operating speed. If all the material is a short length and it is only possible to get one cutting from each, they can be passed through one after the other at very high rates. If two or three cuttings can be obtained per piece of material presented then it slows the operation down, as the operator has to keep hold of the end of the material while it passes through the blades and then bring it back to pass the rest though.

Operators need to be trained in the most efficient way to use the machine because despite being fairly simple it can take a while for an operator to get used to it. The machine only makes the cutting—it doesn't stick them into cells. When we are looking at work rates we have to take into account that someone has to stick the cuttings into a cell tray. We would have one person sticking to the machine's output, so output figures compared to hand cuttings need to be based on two people using the machine. We work on a rate of 350 cuttings h^{-1} per person for hand cuttings. If the machine is working at 1500 to 2000 cuttings h^{-1}, for two people we are looking at a comparable rate of 750 to 1000 cuttings h^{-1} per person. This is an increase in output of between 114% and 185%.

The speed of cuttings insertion can also be increased by not stripping leaves from the base. We have found this to be unnecessary especially with small-leaved types. The problem comes with larger-leaved types, where they tend to spring out of the compost.

Types we do not strip include *Lonicera nitida, Potentilla,* and *Lavandula,* whilst those we find we need to strip include *Euonymus, Escallonia,* and some *Spiraea*.

Plus Points and Problems.

Uniformity. Once the machine has been set to length, all the material passed through will be cut at the same length. This means that when inserted all cuttings will be of an even length making subsequent pruning operations much easier and uniformity can be maintained. The length adjustment is very easy meaning any change of length of cutting required can be made quickly.

Machine Design. The machine has been ergonomically designed so that the operator can work for extended periods without tiring. However, it is best to swap staff round as much as possible because of the tedium of operating the machine. The Teflon-coated stainless steel blades ensure a clean cutting every time and we have a policy of replacing the blades once a year. This would normally take place at the start of the new season. During a season we would expect about 400,000 cuttings to pass through the machine. Parts are very easy to replace and the only ones that we have had to replace since purchase have been belts and blades.

Counter. We have found the counter to be not particularly accurate, but it still gives a rough guide to numbers produced. It works well for narrow non-bushy subjects such as *Lavandula, Potentilla,* and *Lonicera nitida*. For leafy cuttings such as *Euonymus* or *Spiraea* we have found that as the leaves pass though the infrared sensor, it can give a double count.

Prickly Subjects. Unfortunately the machine will not cut prickly subjects such as *Berberis* or *Rosa*. The machine is designed to be gentle on the material. When the rubber belts carry the material through, thorns tear the belts and stick into them. We have had limited success with *Berberis* ×*stenophylla* but no others.

Blockages. From time to time, especially with leafy material, we get a build up of excess material inside the machine. There are four "flickers" positioned just outside the blades to clear most of the excess, but periodically we find it necessary to clear the inside of the machine.

CONCLUSION

There is no doubt we would not be without the Plant Cut now. We would like to put more plant material through it, but we are satisfied with what we are producing. We have recently tried being more precise at passing material through, so that the blades cut just below a node. This is a little slower but is worth a try. Ultimately it would be good to take the process one step further and have cuttings inserted into a cell tray, thus reducing the labour requirement to just one person. I am sure someone is working on the concept now.

I feel as if there is still more for us to learn about the Plant Cut. It may be that long term it would be worthwhile growing extra stock plants to compensate for the amount of material that is used for some varieties, therefore reducing the number of taxa we still do by hand, but quality is all important. Despite being an important addition to our cutting preparation team, in a way it is good to know that it will not do everything and we still have to take some cuttings the traditional way.