MECHANIZATION OF ROSE TREE PRODUCTION

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In looking at this topic it must be understood that methods in areas covered will vary. I am in no way suggesting that the points raised here are the only means that rose tree production may be mechanised.

Soil Structure. Before starting to produce a crop of roses the first thing to note is the possible soil structure that a field can offer. I like to take a sample of soil from an uncultivated area, which can usually be found in a corner of a field, and compare it with that found well out into the field. Usually there is a noticeable difference. For instance, on many clay-based soils the particles are much more compacted in the middle of the field compared with the edge. Soil structure is a very important factor and can influence the cultivation, as well as the quality of crop.

Cultivation. The primary operation has to be sub-soiling followed by ploughing. As an alternative a digging machine can be used. These machines are non-rotary in action. Their digging action completely distributes any material on the surface throughout the whole of the working depth. Another advantage of this method is the variance of tilth as fine as that produced by a rotary cultivator.

The digging machine does, however, retain a soil structure where rotary cultivation tends to destroy it. Ploughs or any machine with a rotary action can, especially on clay based soils, create a pan or smear, which should be avoided. The digging machines cannot do this purely because of the downward thrusting action of the spades. This gives a further advantage as there is a reflection of this action below the working depth which aids drainage.

The time of year that we transplant stocks is when the weather is often variable and if we only disturb the soil when we are ready to plant, the resultant conditions are probably the best achievable.

The use of a reciprocating harrow directly onto the ploughing is a more conventional way of obtaining a planting surface. These machines will give a grading effect, and should be followed with a spring-tined cultivator to give the final tilth. With this method, care must be taken, especially on clay-based soils. Once again, these can smear and pan if the moisture level is high. Rotary cultivators are the last resort.

Planning the System. When adopting a system for rose growing we must consider all the operations necessary, from transplanting, through crop maintenance, to harvesting.

The most common width of bed used is 1.30m; with this we can operate a system of 1.70m. This allows a row width of 0.76m. Growers in the UK use anything from 0.71m up to 0.92m. However, the most common rule is the dimension of the tractor wheel centres used, divided by two to give the row width. It is, therefore, at the planning stage that we must consider the following points: 1) Are the fields flat; 2) if there are gradients, do they vary; 3) is the soil light or heavy?

We are dealing with a very high value crop which will take two years to produce, so we must have sufficient room for the tractor to move without causing damage. Always consider giving extra land to the wheeling, possibly 5 to 7 cm per row.

Transplanting. The final cultivation before transplanting must not leave the soil too loose and light, although a good surface tilth is desirable. The base of the neck of the root-stock has to be set at finished ground level. To set up a transplanter, a sample of the stock to be handled is placed in the plant holder and the mechanism rotated to the point of release. Observing from the rear, it should be possible to see where ground level will be at a given planting depth and how the root system will be contained in the furrow. If the root system protrudes below the base of the share, reposition the stock in the holder, or root pruning, will have to be done. The root system must never protrude below the base of the share otherwise "hockey stick" roots will be formed. Fine adjustments can be made in the field. Plant spacings generally adopted are 125 to 150mm.

We have to decide if we are going to earth-up now or make it a separate operation. Other operations need to be considered before earthing-up. It is easier to observe the quality of planting if you don't earth-up. Also, "gapping" is easier. When we earth-up as a secondary operation the application of fertiliser along the row can be made. It is preferable to earth-up the stock to within 25 to 50mm, this will give very good protection, preventing frost damage and the root stock from drying out.

Weed Control and Crop Maintenance. It has been the practice over many years to apply a chemical herbicide overall after the earthing-up. There are three options: chemical; chemical with mechanical; and mechanical. A chemical/mechanical operation is possibly the best. If a herbicide is applied just as a band only over the rootstock, then the growing crop should remain weed-free and the centre and wheelings can be mechanically controlled. A full mechanical control can be effected by the used of inter-row cultivators plus a blowing machine to deal with weed growth between the stocks. This method does require the earthing-up operation to be undertaken after each pass of the blowing machine.

During this first growing year it is probable that irrigation will be used. We must ensure that full use of applied water is made and that it is available to the crop without wastage. Too often this water will run off. To overcome this, break up the topsoil so that run-off is prevented. This operation can be worked very satisfactorily where the chemical/mechanical method of weed control is adopted. The machine is known as a ''soil loosener''. The machine has a wide spring with a trailing beam onto which is attached a leg with a winged foot similar to a subsoiler, but smaller. The machine only works the top soil to a depth of 150mm. The effect is to burst up from below the surface giving fracturing of the soil thus making it retain water. An added bonus is that the soil is aerated.

Budding. Before the budding can proceed the soil used to earth-up the crop has to be removed. This can be done in three ways, by hand hoe, by brushing machine, or by blowing machine. The first method is self explanatory. The brushing machine is worth consideration where the soil is reasonably light. If the soil has capped, through the action of rain or irrigation the brush alone can have difficulty in moving the soil cleanly away. It is worthwhile placing tines or shares on either side of the row to break the soil. The blowing machine is the best piece of equipment to use as there is no mechanical contact with the stock, only an air blast to remove the soil.

Secondary Maintenance. Once budding is complete a further inter-row surface cultivation can be made with a spring-tined cultivator. Another excellent machine to use is the soil loosener, but this time fitted with surface cultivating units. Fit plant protection plates to any machine used so that no soil is thrown against the bud. After a short period a second application of herbicide may be applied and the grower must decide what further maintenance has to be done. This dictates whether or not to adopt a chemical or chemical/mechanical weed control for the rest of the growing period.

Heading-back. Heading back is the term used for the removal of the unwanted stock top. The cut is made at about 12mm above the bud. Because budding is a manual task the bud height is variable, which means heading-back must be a manual operation too, but the waste can then be collected mechanically. Firstly, it is necessary to windrow the material to create sufficient bulk. All movement of these tops must be from the back of the stock so as to minimise damage to the bud. For windrowing, an ordinary agricultural swathe turner, set in a high position, will roll the stock top quite easily. The ideal machine for their collection is a full-chop forage harvester. These machines will chop lengths of about 25 to 50mm, which is thrown in the air, falling back onto the field, this will then break down. The only pieces that can possibly be found will be the occasional crown.

Third Maintenance. Three operations have to be considered: feeding, cultivating, and a final application of herbicide. A band application of fertiliser, often high potash, can be applied and at the same time a tilth should be produced to enable an application of herbicide to be effective. The soil loosener again has a very important role to play in aeration. During the period up to harvest a further mechanical operation is to "stop" the crop, cutting back the top to encourage extra shoots to break from the bud. Invigorating the plants in this manner can create more first grade trees. The machine used is a band saw, mounted on the horizontal. This machine can be either P.T.O. or hydraulically driven.

Before harvesting the crop, defoliation may be considered. The spraying of a solution of sulphate of ammonia if the weather is dry and warm can cause abscission effectively. Another possibility is leather thongs mounted onto a horizontal cylinder driven via the tractor P.T.O.

The machine that was used to stop the crop earlier, can be used to reduce the overall length of the trees. This is necessary to give uniformity to the height of tree to prevent damage to the crop while lifting. The height of cut is usually 50cm or less, but some growers cut back to 25cm.

Harvesting. The harvesting of the crop can start in early September. At this time of year the ground can be dry, especially on the heavier soils. To ease the entry of the lifter into the ground, first break up the headland using a deep cultivation tool.

Vibrating subsoilers will give an excellent shattering effect. With just two tines following the tractor wheels this machine can be taken through the crop with care, but only go over ground that will be lifted in the short term, traction later in the season could be difficult. If the use of the soil loosener had been adopted it may not be necessary to go through the crop with the subsoiler.

Lifting machines fall into three major categories. Fixed share, powered shaker, and side digger. For single row lifting it is usual to use a share width of 50cm, this will also allow a working depth of 25 to 30cm. The form of this share is an inverted "U", or if fitted to a winch plough or side digger, a "J". The dimension for a two-row share can be up to 150cm in "U" form.

Powered machines adopt two principles, one where the front share is fixed with movement of a shaking mechanism behind, and the other is where the front share also moves.

Some machines with a fixed front share have a shaker unit attached to the rear edge of the base and are hinged at this point, while others have a swinging grate. The main advantage of the swing lifters is that there are no bearings, axles, or moving points below ground so they should have an extended life. The machines

with a movement to the front share can aid the passage of the machine through the soil but it does mean that a number of extra mechanical parts are required to create this movement.

Once the trees have passed through the lifter, and have been gathered into bundles they are then tied with a tractor-mounted machine.

The Future. What of the future? A lot will depend on market trends and developments in alternative production methods, such as micropropagation. One company is at last finalising the production of a single row harvester with a tying machine mounted within the harvesting length of the machine. Developments will take place, but in which areas I cannot say, other than it will depend largely upon growers to create demand.