Industry Report

Rose Care for Australian Conditions

Rose expert Wim van der Ende from the Netherlands recently conducted a workshop for growers in Queensland. Here we present a summary of his presentation.


Wim van der Ende.

Substrate

Roses can be grown in all kinds of substrates. However it is important to take into account the water capacity, Aeration and stability of the structure of the substrate. The structure of organic substrates always changes during growth due to rot. This is easily seen with roses grown in cocos peat in buckets or boxes. The volume shrinks. Because of this process the density of the cocos increases and it will become much wetter.
It is important not to water too long during the afternoon in order to maintain sufficient oxygen in the cocos for the dissimilation process of the roots. This process ensures that enough energy is available for the active nutrient uptake process during evening and night. (Waterings of 800- 1000cc/m2 per time every 60 minutes). There should be about 3-5L of substrate available per plant, to ensure against water-shortage.
If the substrate volume shrinks, as can be seen in boxes or buckets, good results have been reached when the plant, including the cocos, is lifted out of the buckets and boxes and a layer of fresh cocos is put on the bottom. This layer acts as a drain-layer and new roots develop very well in the fresh cocos.

Fertilisation and watering

It is often thought that plant growth production quality can be influenced by changes in fertilisation but this is not generally the case. If the plant is getting enough water with a Cf that is high enough, and there is sufficient drainwater (>35%) and all nutrients are in the fertiliser-solution, then the plant is getting sufficient nutrients offered.
The activity of the roots and the pH of the dripping-water are the important factors for sufficient nutrient uptake. A supply-Cf of 14-17 will not influence the growth and quality. But if the Cf in the substrate increases too much, growth and quality may both be affected.
The right supply-Cf can be calculated when certain values are monitored. If the water volume that is supplied and the supply-Cf is known, the total Cf given can be calculated:

Supplied-water in L/m2 * supply-Cf = total Cf supplied

If the volume drainwater is known and the Cf of the drainwater is measured, then the total Cf that is drained out of the substrate can be calculated:

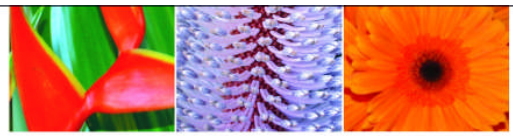
Drainwater in L/m2 * drain-Cf = total Cf drained

When the volume of drainwater is deducted from the volume water supplied, then we know how much water (A) has been taken by the plant. If the same is done with the Cf, then the
Cf taken up (B) by the plant is known. When B is divided by A, then the answer shows the Cf that the plant has taken up per litre water taken up. The supply-Cf should be 0.2-0.4 above the Cf taken up. The drain Cf should be 0.3-0.4 above the supply Cf.

	L/m²	*	Cf	=	Total
Supply	40		14		560
Drain	18		20		360
Uptaken	22				200
Uptaken Cf per liter water uptaken					9.1
Supply-Cf					11 – 13
Drain-Cf					14 – 17

Table: Calculation Supply-Cf

The pH of the water that is given to the plants should be between 5 and 5.5. Higher pH values have a negative effect on the uptake of nutrients. The uptake of nutrients will also cost more energy, which is lost for growth (production and/or quality).



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Watering strategy

The watering strategy depends on the weather. A rough guideline is that per 1000J/cm2 accumulated light 3000cc/m2 water should be given. When, for example, the total light sum at the end of the day is 2500J/cm2, approximately 7500-10000cc/m2 should have been given (2500J * 3000cc/1000J).
The frequency and duration of watering is another matter.
The larger the substrate volume, and/or the older and therefore denser the substrate, the shorter the watering duration should be.
Particularly in older and denser cocos, only a few large waterings are necessary, especially in autumn and winter.
Normally the substrate should dry out after the last watering by water-uptake by the plant and/or drainage. A guideline to see if the substrate dries enough during the night, is to monitor when the first drainwater is found the following morning. After the first 600cc/m2 no drainwater at all should be found, but after 1200cc/m2 supplied water, drainwater should be found (10-20%).
Normal waterings should be given on both time settings and light sum. A possible strategy is the following: start watering an hour after sunrise, the second watering half an hour later, and then every 60 minutes till 12.00 or 13.00hrs. Between 9.00 and 14.00hrs water could be given also on light sum.
When the radiation during an hour is e.g. 700 W/m2, then the light sum during that hour is:

700 * 0.36 = 252 J/cm2
Per hour 252 * 3000/1000 = 756 cc/m2 should be given

Depending on the substrate (dense or more open) this should be given in one watering per hour or two smaller ones per 126 J/cm2. If the substrate is draining easily (e.g. fresh cocos peat) then waterings could be smaller and more frequent.

Stock solution

A stock solution is based on clear water, e.g. rainwater. If other water sources are used, an analysis of the water should show if the water is suitable, and which elements are to be taken into account by calculating the stock solution to be used. Nutrients that are already in the used water can be deducted from the stock solution, depending on how high the levels are.
Most other water sources contain HCO3- and Ca++ and Mg++. Acid is used to neutralise HCO3-. Ca++ and Mg++ will be deducted from the stock solution. This will be shown in a code: A.x.y.z. X means the acid that is needed to neutralise the HCO3- and Y will show how much less Ca++ has to be given and Z means the same for Mg++. So rainwater will have the code A.0.0.0.
Water with, for example, 4.3 mmol HCO3-, 1.65 mmol Ca++ and 0,55 mmol Mg++ will have the code A.8.6.2.

	Mini-mole per litre						Micro-mole per litre				
EC	K^+	Ca^{++}	Mg^{++}	NO_3^-	SO_4^{--}	P^-	Fe	Mn	B	Cu	Mo
1,5	4,25	3,5	1,75	10	1,75	1,5	30	5	30	1,5	1,5

Table: Stock solution for rain water

Analysis

The relationship between the nutrients is important. In the following everything is given in mmol/l:
- EC depends on EC-uptake per litre of wateruptake/m2 :1,5-2.8 mS/cm or Cf 15-28 (see above)
- K+ and Ca++ should be equal or Ca++ a bit higher
- Mg++ and SO4 -- should be equal to the EC and or a little higher
- NO3 - > 1.2 * (K+ + Ca++)
- HCO3 -: > 0,4mmol/l
- P; depends a lot of HCO3 -: when HCO3 - is low, P is high and vice versa;
- Fe: 10-20 times EC
- Mn: 2-10 umol/l (depends a lot on HCO3 -: high (low Mn; maximum supply 200%)
- Zn: 3-7 umol/l
- B: 20-40 umol/l
- Cu: 0,5-3 umol/l
- Mo: 0,5-1,5 umol/l

Changing solution

When an analysis has been made, it may be necessary to make an adjustment, if some nutrients are out of range. Adjustments should only be made when the results differ greatly, or when a nutrient increases or decreases in three consecutive analyses.

Re-using drainwater

Drainwater can be re-used as feeding water after sterilisation. There are several methods but sterilisation by heating is the only reliable one because it is exactly measurable.
Under Australian conditions heating of the water will cause problems, because the water will be too warm when reused. Warm water has only a low oxygen level. Because of the higher water temperature the conditions in the root environment will be ideal for fungi, especially Pythium and Phytophthora. The water should have a temperature of 60˚C for three minutes or 90˚C for 30 seconds. 90˚C is necessary to kill all viruses. Fortunately we don't have many problems with viruses in roses. So 60˚C for three minutes is sufficient: All fungi, bacteria and nematodes will be killed.
The second best method is UV light. This method is only reliable when the water is clean. All dust and other materials must be filtered out of the water so the radiation from the UV lights won't be blocked. All other methods are not 100 percent reliable.

Planting

In Australia, the best planting time is early spring, when the temperatures are still reasonable and a good plant structure can be built. Research has proven that the thickness of the basal shoots in the first year is responsible for the quality and production the following years. In order to get sufficient thickness it is important that those shoots are not grown under high temperatures. Under high temperatures, especially when night temperatures are high, there are not enough sugars left to build a good plant structure.
When young plants are planted, it is important that the cutting leaf is still on the plant and that the primary shoot is long enough. On the primary shoot side-shoots will grow in the top. As soon as the side-shoots have elongated, this will be bent, but not kinked. If the shoot is kinked, the sap flow will be blocked, and the ground shoots that are forced to grow will be thinner.
If everything is bent and kinked, the whole crop will be on a flush, and this has consequences for root growth. As soon as the primary shoot bends, the plant will lose some roots, and when the shoots are kinked, the plant loses even more roots. Those roots have to grow back again. This takes sugars, which otherwise could have been used by the new basal shoots, to make them fatter and stronger.
Of course this planting time is not ideal for achieving the better prices in the winter period. However, when the crop has got a good structure, the production and the quality both will be higher, so the crop lasts longer. The basal shoots will be picked on two or three 5-leaflets. The next layer will also be picked on one to three 5-leaflets. The third layer will be picked shorter, and so on. As soon as the quality drops those roses should be undercut on strong canes. An advantage of building up a higher crop is that the control of pests and diseases is easier. Because of the height of the crop it is easier to spray from underneath.

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