



MANUAL FOR CUT FLOWER ROSE GROWING

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**LEIMUIDERBRUG,
April 2007**

General.

**The below recommendations can not be seen as a blue print to grow roses.
Each greenhouse has a different habit and reaction.
Each variety is reacting different.**

1. BASICS OF GROWING:

1. CARE FOR GOOD BALANCE BETWEEN:

- LEAVES,
- LIGHT,
- WATER,
- FERTIGATION,
- ROOTS

2. HARVESTING OF FLOWERS:

- WHEN HARVESTING, à REDUCTION OF LEAVES,
- REDUCTION OF LEAVES à REDUCTION OF ROOTS,
- REDUCTION OF ROOTS à RISK OF ROTTING,
- RISK OF ROTTING à EXTRA LOSS OF ROOTS,
- EXTRA LOSS OF ROOTS à LOSS OF GROWTH.

3. MOST PREFERABLE GREENHOUSE TEMPERATURE:

	Night	Day:	Ventilation temp
Summer:	18 C	20 C	22 C
Winter:	16 C	19 C	21- 22 C

4. GREENFINGERS

The manager of the farm needs to have good feelings for plants and climate.

2. GROWING MEDIA's

DIFFERENT GROWING MEDIA's

- | | <i>Advantages</i> | <i>disadvantage</i> |
|--|---|--|
| • Soil | <ul style="list-style-type: none">- no extra invest- less sensitive- no recycling of water,- irrigation by sprayers or drip lines | <ul style="list-style-type: none">- needs sterilisation- slow correction |
| • Rockwool in gutters | <ul style="list-style-type: none">- no sterilisation- tables needed- quick correction- recycling of water, | <ul style="list-style-type: none">- sensitive- quick show of lac's- only for stentling and cuttings- control of drippers, |
| • Coco fibre in baskets or gutters | <ul style="list-style-type: none">- no sterilisation- tables needed- quick correction- recycling of water,- irrigation by in lines | <ul style="list-style-type: none">- sensitive- quick show of lac's- also useful for bigger plants |
| • Perlite or Vermiculite in baskets or gutters | <ul style="list-style-type: none">- no sterilisation- tables needed- quick correction- recycling of water- irrigation by micro sprayers | <ul style="list-style-type: none">- sensitive- quick show of lac's- also useful for bigger plants |

3. MEDIA PREPARATION

- Soil
 - Proper soil loosening,
 - Additional peat/cocos/straw/cow manure to get good basic preparation Ph 6 -6,5 and Ec < 0,7
 - Soil has to be sterilised for 8 hours up to 100 C until 60- 80 cm deep.
- Rockwool
 - Care for proper drainage of the gutter.
 - Care for proper “spaghetti” of 3 mm diameter.
 - Rockwool to be over-watered before planting.
- Coco fibre
 - Care for proper drainage of the gutter.
 - Care for proper “spaghetti” of 3 mm diameter to mini sprayer
 - Coco fibre to be watered before planting
- Perlite
 - Care for proper drainage of the gutter.
 - Care for proper “spaghetti” of 3 mm diameter to mini sprayer
 - Perlite to be watered before planting

4. TYPES of PLANTS

DIFFERENT TYPES of PLANTS

	<i>Advantages</i>	<i>Disadvantages</i>
Stentlings	<ul style="list-style-type: none">- late fixing of variety,- good quality flower,	<ul style="list-style-type: none">- soft plants- careful handling- length of stems + 10%
Rooted Cuttings	<ul style="list-style-type: none">- late fixing of variety,- cheaper plants,- 10 % more production.	<ul style="list-style-type: none">- not in soil.
Half year old trees	<ul style="list-style-type: none">- 8 mnths fixing of variety- "strong" plants,- easy to handle,- easy shipment,	<ul style="list-style-type: none">- not in rockwool,
Trees	<ul style="list-style-type: none">- 16 mnths fixing of variety- expensive plants- strong plants,- easy to handle,- easy shipment,	<ul style="list-style-type: none">- not in rockwool

5. PLANTING:

1. Preparation of planting of rockwool
 - Irrigation system should be working before planting
 - Mats to be filled trough the drippers. (Extra gifts to fill the mat)
 - During very sunny / hot period while planting, than it is preferable to put chalk on the roof to avoid too much heat and direct sunshine.
 - Also the shading curtain can be used additional if existing.
2. Quantity of plants per m2.
 - There are different ways of planting, 2, 3 or 4 row system. The chosen system depends on what is the personal choice. The quantity of plants per m2 is the most important.
 - General only 7 – 7,5 plants per m2 greenhouse are planted, depending on the variety. If less plants are planted, the year production of flowers will be too low. If more plants are planted they will compete with each other and the quality becomes less.
3. Way of planting
 - If planted in 2 rows, than the head leaf of the rockwool plant should be directed to the inside of the two rows. In case of 4 rows, than each time the two by two to the inside.
 - Drippers to be re-placed - straight up - immediately in the blocks/plugs.
 - Water to be given as soon as possible per valve after planting.

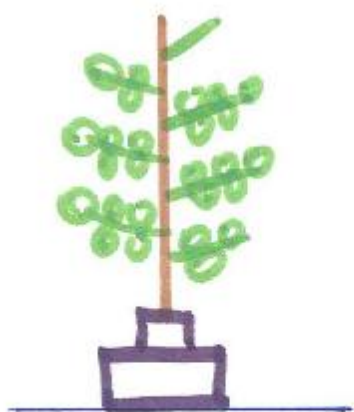
6. CULTIVATION



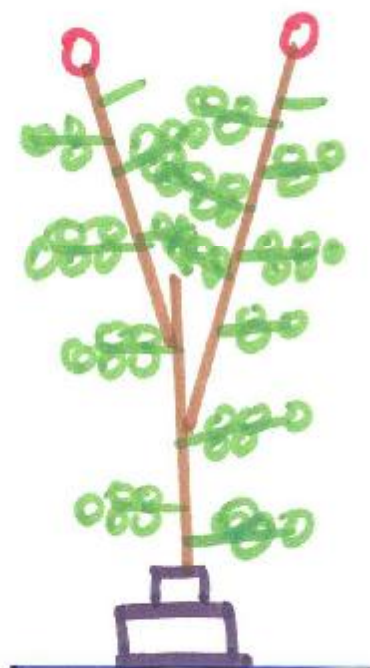
W1: Planting



W3: Plant gives a pea sized bud



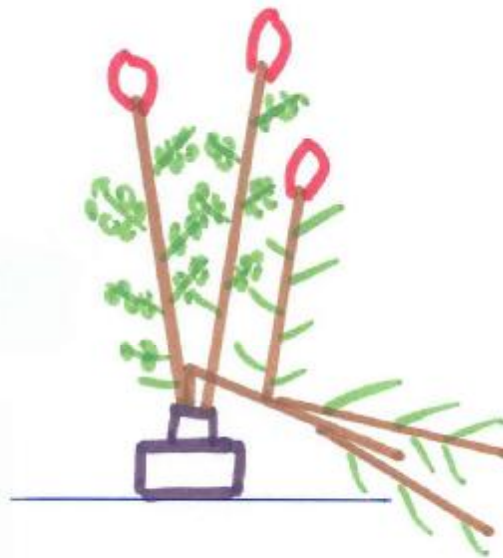
W3: Remove bud



W7-8: New shoots show bud with pea-size



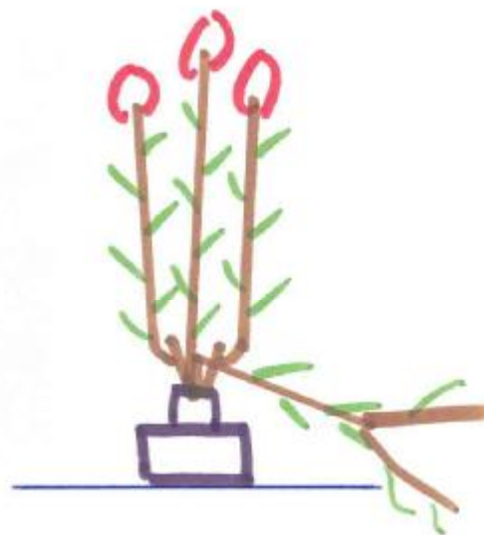
W 8: Removed the bud.
Bending over 90 degree,
No breaking.



W13-14: First flower production

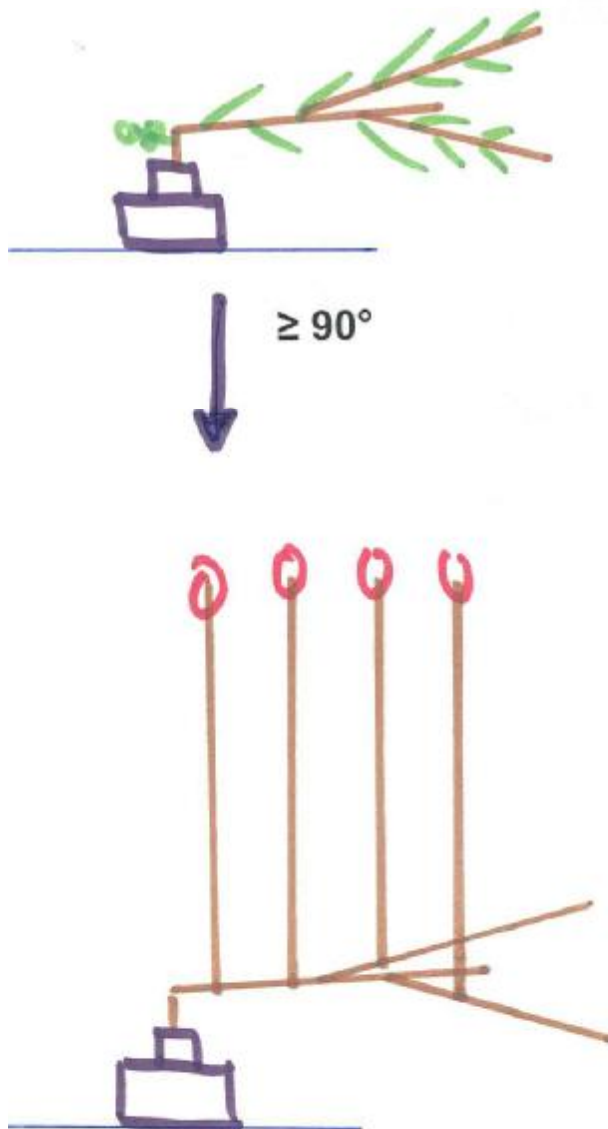


W13-14: Harvest flowers on lip or
3 fold leaf. Remove the shoots
from bended shoots completely

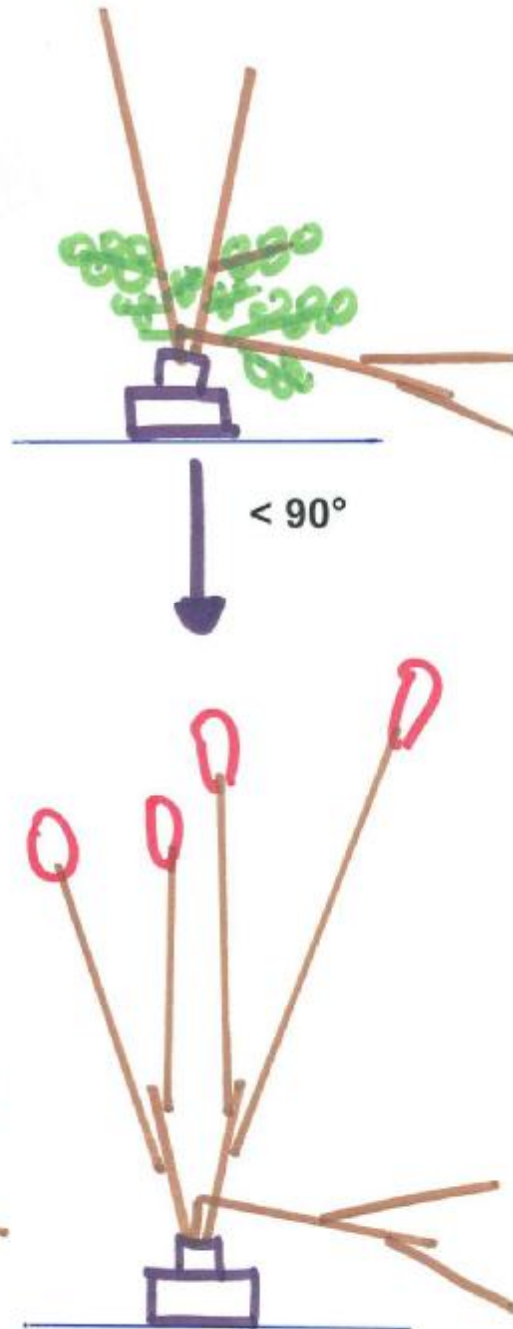


W20-21: second flush.
harvest on 3 fold leaves

WRONG



CORRECT



SOME BASIC RULES

- Basic leaf of the cutting should be directed to inner side, so bending will also go to inner side. Opposite row goes to first row, so at bending the branches will cross,
- Put irrigation pen in the bloc or plug thoroughly through, but do not go to bottom to avoid the plastic to become hurt. In case of the variety is not too strong in the roots, stick the pen beside the bloc or plug two weeks later to get a better rooting through.

Some varieties are very slow to root in to the slabs. The plants risk to fall off the slabs. In such cases it is recommendable to put the pens beside the bloc or plug in to the slab. This makes the plant searching for water and growing in to the slabs

- In case of bending it is very important that the angle downwards is less than 90 degree. This is important to avoid growing at the bended stem. Growing has to come from the basic cutting to create a strong well balanced plant...
- Bended stem with the leaves are to be considered as the long of the plant, so they are important too.
- In case these side shoots still grow, cut them at harvest stage right up to the stem. Do not leave a piece of stem.

7. IRRIGATION

SOME BASIC RULES:

- If drip lines / sprinkler systems etc. are longer than 20 m, it is recommendable that they are connected from two sides.
- Small plants consume less water,
- Big plants consume in summer time approximately 1 litre per plant per day.
- Big plants get usually 30 – 40% over drain, to be sure all plants get enough water + fertilizer
- With big plants in summer time, we start irrigation at 06.00 to 16.00 hour, approx 100 ml each dose
- With big plants in winter time, when there is less light, we start irrigation at 07.00 to 15.00 hour, approx 60 ml each dose
- In summertime, we water big plants at least once every hour and in the hottest period of the day every 30 min.
- In wintertime, we water big plants each 2 hours during the irrigation period.
- During night time, no irrigation.
- Every week proper distribution of water of each valve has to be controlled by putting a cup under one of the drippers and measure the content after one irrigation.
- Filters to be controlled each 2 weeks on sand and algy

8. FERTIGATION

SOME BASIC RULES:

- The young plant fertigation schedule (first 2-3 weeks)based on the **use of rainwater** for Medium growing is:

Solution A (1.000liter):		Solution B (1.000 Liter)	
CaNO ₃	82,9 kg	Mono kalifosfaat	18,4 kg
		Bitterzout	39,3 kg
		Magnesiumnitraat	6,5 liter
		Kalisalpeter	21,1 kg
Fe- DTPA 3% Lic	7,9 liter	Mangaansulf. 32%	185 gram
or,		Zinksulfaat 23%	130 gram
Fe-DTPA 8%	5,0 kg	Borax	240 gram
		Kopersulfaat	56 gram
Fe-EDDHA 6%	0,6 kg	Natrium molybdaat	36 gram

- Then the basic schedule for the fertigation becomes as above but in Solution A only 62,9 kg CaNO₃.
- The dosing should be controlled weekly by means of Ec and pH.
- It is important to control the Ec of the over-drain also weekly.
- Monthly complete water analyses from the medium (rockwool) or the medium itself (coco peat) should be taken and analysed to optimise the fertigation. The analyse report usually tells what to adjust,
- It is important to check the quantity of water at the beginning and at end of the drip line, to have a proper distribution of water and fertilizer.
- Care for twice a year cleaning of the drip system by backward sucking with a pump.

9. CLIMATE

SOME BASIC RULES

- The RV should be around 80% day – 85 % night if possible, to create a good growing circumstance.
- Avoid draft in the greenhouses.
- Avoid complete opening opposite windows to a minimum.
- Use shading screens for 80% only when there is a high light intensity and a temperature over 28 degrees.
- Greenhouse can be cooled with rooftop sprinklers, when it is hot. In that case it is recommended to close the screens also up to 85%, to have a chimney effect. The off wind side of windows should be open. The wind side will be opened max 15%.
- The 85% RV in the night can be obtained by the use of a minimum temperature in the ground pipe of 45 degrees. The computer should do the rest.
- If there is little light (In wintertime?), there is no need to heat up to 19 degrees. 18 degrees is okay. The same for the night temperature.
- Aeration should preferable be done of-winded.
- Only with temperatures above 27 C, one can open both sides of the windows. This means that the wind side will be max opened for 30%. This can be blocked in the climate computer.
- Opening both sides will risk spiders, trips and lice to get in the greenhouses and create a big draft. It is important to care for the relative humidity.
- In hot periods it is advisable to start the aeration early in the morning at 06.30. This reduces the heat load during the day. During the afternoon, it is important to get the temperature reduced gradually.
- In case of sudden heavy winds, usually there is a automatic closure of the windows to be installed. Look for this facility in the computer. It is advisable to keep 5% opening in such case to avoid under pressure, which will risk the glass to be blown out.
- In case of (shading)chalk is used, we usually put it in June and you should remove it around mid-September.

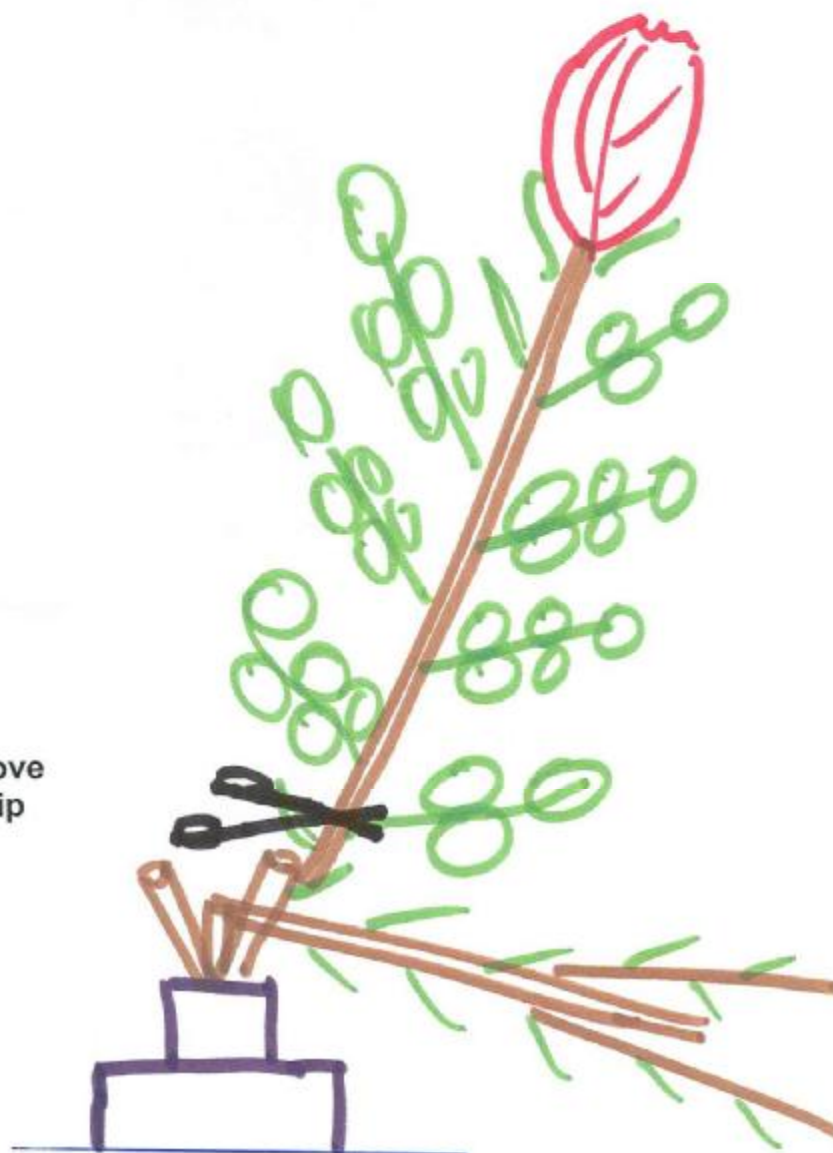
10. HARVESTING

BASIC RULES:

- Put the harvesting buckets the evening before harvesting in cool store on a trolley with 10 cm clean water **(5 litres)** and rose nutrient (FLORISSANT®) to have cold water.
- Harvesting should be done starting early morning and in order to get a more homogeneous quality, during hot periods - twice a day - depending on the variety. Often during 3 summer months two times will be required to have a homogeneous bud in the bundle. .
- **Use the same people for harvesting in the same variety, so they are better focused on the opening size of the buds.**
- **Arrange to have pictures from the different stages of opening of the flowers, so it is easy for the managers to explain which bud size to be cut. It might differ during the season.**
- **Keep the water in harvesting buckets clean: remove leaves from the water.**
- **Renew the water 2 times week. If there is not sufficient water in the bucket, refill only with water from the same preparation. Never add with new mixture.**
- Care for harvesting shears which are sharp.
- **At cutting, one should always cut just above the leaf or the lip. If one cuts just in the middle of the internodium, you lose average selling length. It also takes 7 – 10 days longer in winter time before the re-grow starts again, which means an important production loss.**
- **Hold the flowers on such a way on the arm or in the container, that the ends of the stems are all on the same length. This is important for de-leafing and drinking/consumption of the water by the stems.**
- Keep flowers maximum 1 hour after harvest in the greenhouse. The sooner the better they should go in the cool store.
- Keep the flowers at least 2 hours in water in the cool store before grading. Certain varieties need more time in the cool store if they are grown with a lot of light to close the stomata..

- Usually the flowers - in harvesting stage - are cut on a lip or three fold leaf from below. Thin stems are being bent down wards similar as explained on bending. The leaves of this bended stems are the longs of the plant. It is very important to have a good number of active leaves. In principle we keep harvesting upwards, which means that after 7 – 8 flushes (1 year) the cutting place would be 15 cm higher. This also risks that the stems become thinner.
That is why we start undercutting at least 2 flushes once the flowers prices go down (15th May) in order to get good strong stems again.
- Monthly it is a must to fix 10 marked washing pins for each variety with the current harvesting date on the part remaining after harvesting. On the moment the new grownflowers are harvested again we note the days, so we know the growing period during that period of the year. There is a difference although the year. Each flush, this should be noted.

Cut just above
the leave / lip



11. GRADING & BUNDLING / POSTHARVEST

SOME BASIC RULES:

- Care for a temperature in the grading and packing hall of max 18 degrees.
- Prepare for good light at grading and bundling working stations.
- Look for proper height of working tables,
- Prepare measurement on the tables,
- Prepare the routing of the products,
- Prepare internal transport for the flowers,
- Prepare system to fill the water trays with FLORISSANT®
- Temperature of cool store to be 2 – 3 C,
- Care for a dryer in the cool store, to avoid too high humidity,
- High humidity risks botrytis in the flowers,
- Use FLORISSANT in the buckets or containers to avoid growth of bacteria which has a bad influence on the vase life.,
- Care for daily cleaning of cool store, packing and grading hall

PROCEDURE:

- **THORNS/ LEAVE REMOVING**
As per request of the buyers, thorns and leaves from the below part (20 cm) of the stem can be removed with a de-leaving machine (type Olimex). Be careful not to hurt the stems too much. (Put a bucket under the machine to collect the thorns + leaves).
- **LENGTH GRADING**
For easy length grading, several lines (use different colours) on the grading table should be made with 5 cm difference, (from 0,50 cm to 0,80 cm always with 3 cm extra) for easy grading. Care beside for the length grading, **similar stem thickness** and bud size of the flowers. Open flowers should immediately be put aside.
Usually the saleable flowers are sold per 50, 55, 60, 65 cm etc. depending on the variety

- **WRAPPING**
 - A rib(?)carton of 10 cm width with the smooth side to the interior is put in a mal and 4 rows of 5 flowers are carefully put in the mal.
 - The buds should be at least 3 cm from the top inside the carton. The carton is fixed with a quality sticker or a rubber.
 - The stems are tied below at 10 cm from the end of the stems, so in case of length cutting and receiving the flowers the below 3 cm can easily be cut of.
 - The carton is fixed around the buds, to protect the buds from damage during transport.
 - After wrapping the stems are cut all at the same length on such a way that the length is 53, 58, 63, 68, 73, 78,etc
 - Dip the stems after length cutting immediately in water and put an equal nr of bundles in a the bucket of the same size.
 - A bucket with graded flowers have to be put as soon as possible again in the cool store.

- **COOLSTORAGE**
Once the flowers are in the cool store, keep different lots from different days and length properly tagged.

- **PACKING / FIXING**
 - As per the size of the box and the stem length, the number of bundles differs.
 - With a rubber band and two hooks in the box side, the flowers have to be fixed in the box.
 - The heads of the boxes are always put to the end-sides of the box.
 - The rubber band is fixed in the middle of the box. Than the lid is being put in top of it.
 - The ends of the boxes have holes, for pre-cooling. The pre-cooling is done after packing in the cool store. This systems sucks in the cold air, to ensure the flowers travel cool. If this system is not used, it takes much longer before the flowers are at the required travelling temperature of 5-10 degree.
 - It is recommendable to pack always the same quantity of flowers in each box.

- **ADMINISTRATION**
It is a must to maintain a proper administration of quantity and length of the flowers after bundling, so the sales manager knows what to be sold.
Make labels with the order sheet, telling: date, order nr, variety, quantity, customer name with a code and destination.

12. COOLSTORE

SOME BASIC RULES:

- Keep the cool store **clean and dry**.
- Temperature day and night 2- 3 C.
- The RV has to be low to avoid botrytis
- It is recommendable to have several cool stores in case one is exporting,
- Care for doors that are wide and high enough for internal trolley transportation, Remind you only make these doors once.
- Sliding doors are recommendable.

13. CROPMANAGEMENT

PRIORITIES

- Disease treatment goes before harvesting,
- Crop management goes before harvesting,
- Good spraying programs prevent a lot,

GROWING CYCLE

- The immediate measuring of growing time is crucial,
- The measuring of the growing speed has to be done monthly for each variety. Only then, we can make a planning of the harvest.
- The measuring can be done by fixing a washing pin at the concerning small part of the branch from the flower which is harvested on that day. At the moment the new shoot can be harvested, the labour will see the pin and bring the pin back to packing hall. 10 pins each time is enough to get an average of the growing period of a variety. Give the pin the number of the week which they are applied.
- Normally the growing period is between 32 and 45 days, depending on the period of the year, temperature and light.

PLANNING

- Collect the import data from the importer.
- Realise that the flowers have to be 3-4 days earlier on the point of sales. If you know the growing cycle, you know when bending, pinching or dis-shooting has to be started for a certain supply should be realised

CROPMANAGEMENT TOOLS:

- **Bending**
The bending helps to get better balance between roots and leaves. Normally the thin shoots are used for bending.
Bending can be done each 6-8 weeks.
Bending is done
 1. to keep the leaves and roots active and
 2. to force growing shoots from the centre of the plant.
 3. to get extra production after 6-7 weeksRemove the bud and care while bending that the bending corner of the bended part is always less than 90 degree downwards. If not done properly downwards, one risks having tiny growth on bended stem, which give poor quality.
- **Disbudding**
Has to be done at least weekly. This is the removing of the side buds/shoots of the main shoot. At the same time they should remove flowers which were forgotten, to avoid trips nests.
Give workers a bag to carry on their body in which they can put the removed buds to keep the nursery clean. Put a container in the main paths for emptying the bags.

- **Over cutting**
The first bottom breaks are usually cut on one 5 fold leaf from below of the concerning stem. If a new shoot is coming from that eye which was left on the plant, on medium culture, we usually harvest on a 3 fold leave or a lip. This is called “over cutting”.
- **Under cutting**
In case we cut below the place where the stem had grown from, we call it undercutting. This is usual done in winter time on the moment when we get short stems, too high production and the stems become too thin. **In the first growing year we do this in the early summer. The growing time becomes longer now because the eyes needs more time for development.**
- **De-shooting**
We apply this method, if we want to delay the production a little and give the plant a little rest.
We remove the main bud and disbudding is done during 4- 6 weeks.
6 weeks before the flush is wanted, we cut away the de-shooted parts. The thin stems can be bended or undercut. De-shooting is done to store the sugars in the plant and prepare the plant for production on an other moment.
- **Pruning.**
This is not done very often on plants grown in a medium, as the buffer of the plants is very limited. We prefer to keep the plant growing and use tools as under cutting to improve the quality.

14 DISEASES & DEFICIENCIES

MAJOR DISEASES:

- a. **Red Spider**
Very small spiders running at the back side of the leaves. They can be seen by turning around the leaves and put the back side of the spot on the top of your finger so it gets hotter and the spider will start to walk.
- b. **Mildew,**
White powder on or around the buds or on the leaves.
- c. **Trips**
Small, poor formed, flat buds.
If you open the bud, one can see the small trips walking around.
- d. **Lice**
Can be seen on the outer side of the bud and the bud stem. Lice are mostly green.
- e. **Powdery Mildew,**
Black spots on the leaves due to very high humidity. (usually in the night)
- f. **Carter pillars**
Eating from the leaves or small stems.

DEFICIENCIES

Always make a medium analysis to be sure, but first indications as

- g. Light green/ yellowishing of the leaves and dark green a nerve in the top of the plants?: à **Lack of Iron**,
Add: DTPA (soluble iron)
- h. White dots in the old leaves with some yellowishing.?: à **Lack of Magnesium**,
Add: Give more Mg at the fertigation
- i. As for lack of Iron, but although the plant ? : à **Lack of Magana**,
Add:
- j. Empty stems + hollow buds?: à **Lack of Borium**,
Add additional Borium.
- k. Soft stems, pale leaves, use of well water near the mountains?:
à **High Bicarbonate** figures(also high Ph).
- l. Strange buds? Lack of Zn.
NB, Lack of Iron and Magana is often seen together.

15. DISEASE CONTROL

GENERAL

- The chemicals to be use have to be procured locally. Some times the concentration is different to the chemicals in The Netherlands, that is why we can not give such basic list,
- Care for proper spraying masks, gloves and equipment
- Spraying must be done with overcastted sky. Direct sun radiations risks burning. Preferable early morning or after 18.00. This also avoids health problems with other labours.
- Spraying for spider has to be done with a lot of water. The plants have to be washed very well from below as above, as the spider's hides them selves easy.
- Other diseases can be spread from above and need much less water.
- It is recommended to use "soap"
- Before starting with a new chemical, always make a small trial first over 1 m2 on each variety, to see the reaction of variety. There can be big differences between one chemical in different countries, due to concentration differences.
- After a big flush, it is recommendable to apply a treatment of "Aliette" to strengthen the roots and make them easier recover the big change. Re-growth will be better.
- Use proper equipment. High pressure of minimum 25 Ato is required, to ensure the chemical is properly entering the entire crop.

PREVENTION

- The best is to make a good spraying program if certain diseases appear..
- It is also recommendable to train all employees to look after diseases. Once the employee has traced a disease, a washing pin (one colour per disease) can be put upwards at the beginning of the bed to inform the spraying team.
- Chemicals depend on what is available.
- **Try to alternate the chemicals. Keeping spraying one product, makes the insects immune, so spraying has no more effect.**

16. EQUIPMENT + TOOLS

In order to avoid problems, regular maintenance is required:

DAYLY:

WEEKLY:

- Filters of the irrigation system at the unit and at the valves,
- Check if valves of the irrigation are functioning properly,
- Check if dosing is as per the wanted quantity.
- Check the water level of the boiler.
- Check the water unit on leaking

MONTHLY

YEARLY

- aeration system to be controlled for need of additional greasing,
- check if the measuring boxes are working properly with regards to temperature.

17. LABOUR

- THE TRADITIONAL DUTCH PROCEDURE for 1 hectare.
The manager and 5 labours start harvesting early morning from 06.00 or 07.00 as per the light/season to harvest the flowers. As soon as few buckets are full, they are brought in to the cool store.
After first (coffee) break - 09.30-10.00 – 2 labours start grading. The rest keep on harvesting until 11.00 – 12.00.
Once harvesting is ready, all start bundling the flowers until 15.00. After this crop work is done like disbudding, bending or what so ever.
- FOR EXPORT PRODUCTION for 1 hectare.
The greenhouse manager and 5 labours start harvesting early morning from 06.00 or 07.00 as the light/season to harvest the flowers.
At the same time the packing manager can start with one labour the de-leafing the flowers from the day before and 3 graders can start the grading work. 3 bundlers can start also their job. 2 labours should be able to do the wrapping of the carton around the bundles and 1 or 2 labour(s) (transporters) should care for the flow of all the products:
 - flowers from cool store → de-leafing
 - flowers from de-leafing → grading
 - flowers from grading → bundling,
 - bundles from bundling → carton wrapping,
 - bundles from carton wrapping → cool store.At the moment harvesting is ready, the team will do disbudding, crop work,
In summer time, they just go through from 15.00 – 17.00 to harvest the ripest flowers. This means the labours should walk faster as there are far less flowers. If not, they do not finish in time. (With these flowers, the de-leafer starts next morning)
Once ready and boxing for shipping has to be done, the transporters know where the products are in the cool store so they can very easily collect the needed flowers per order or box. Others can do the boxing. The flowers are put with the heads towards both the ends of the boxes. It is very important that the flowers are still kept some 2 cm away from the carton within the box so they have some space. This is to avoid damaging while transporting. The flowers should be properly attached at the inside of the box, to avoid moving within the box. The number of stems per box differs per flower length and variety. Usually we pack one quality of one variety in a box. The remaining quantity will be used for the next shipment or local sales. One should very much care that the size of the buds is the same if one packs several lots in the same box.
Different sizes of flowers of one length are not accepted as one quality by the trade.

18. CONCLUSION

Rose growing is a beautiful job.

Rose growing depends on different parameters and needs to be adjusted from time to time. This adjustment is usually done by a grower who has learned by experience which priorities should be followed.

The climate and irrigation computer helps a lot, but it is very important that a computer is supervised at least twice a day (seven days a week), to see if all commands are executed. That is why it is very recommendable that at least beside the greenhouse manager who should run the climate, one or two assistants are trained to do the job as per the size of the project.

Beside human check, an alarm on several installed equipments is recommendable, so that immediate action is taken.

Prevention and good maintenance will avoid many problems.

This manual will never be complete as the circumstances per location are different. Nevertheless we have tried to make a list of major items which should be taken care of.

Moerheim Roses & Trading BV
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2007