

TEN COMMANDMENTS OF KALANCHOE GROWING

1. Keep a steady balance in the culture in every aspect, avoid as possible any shocks.
2. In the Long Days, keep the culture as dry as possible for the first 8-14 days. No misting.
3. PGR's in the Long Day period, if applied a misty treatment is the right way.
4. At least 14 hours of darkness is needed for induction, for a period of at least 7 weeks.
5. If you can read a newspaper under blackout, it is not dark enough.
6. Short Day interruption is impossible, the moonlight can already disturb induction.
7. In the Short Day period PGR's are at least essential in the induction period.
8. Stretching in Kalanchoe is mainly caused by humidity.
9. Avoid water overhead in the Short Day, never use cold water (under 50 degrees F).
10. Don't use oil based liquid chemicals, unless advised by experts.

TEMPERATURE

- 1. Ideal temperature is 68 degrees F.**
- 2. Every 2 degrees lower than 68 F gives a week delay.**
- 3. Every 2 degrees lower than 68 F means one week less in keeping quality.**
- 4. Lower temperatures increase the flower size (Think about items 2 and 3).**
- 5. Daytime Temperatures over 90 degrees F cause extra stretching.**
- 6. Nighttime temperatures of 74 degrees F or higher cause disturbances in or no induction.**
- 7. Temperatures under 60 degrees F cause disturbances in or no induction.**
- 8. Negative Dif only gives growth reduction if it is inside 3 degrees. (Thinks about items 2 and 3).**

HUMIDITY

- 1. Ideal is around 85% (70-90%).**
- 2. More than 20% difference is the main cause for stretching.**
- 3. Lower than 40% (dry climate) creates problems, weaker plant.**
- 4. Higher than 95% creates problems, softer plant.**
- 5. Condensating of moisture gives a higher risk of fungi infections.**

MICRO-CLIMATE

- 1. Micro climate is more important than greenhouse climate.**
- 2. Pad and Fan system in greenhouses blows away the micro-climate on plantlevel.**
- 3. Irrigation mat improves micro-climate on table and containersystems.**

LONG DAYS

- 4. Rooting period as dry as possible.**
- 5. Rooting hormones not necessary.**
- 6. No misting.**
- 7. Covering for rooting with poly not necessary.**
- 8. Covering for protection against radiation possible.**
- 9. Ideal temperature 70-74 degrees F.**
- 10. Pinching not necessary.**
- 11. Mist treatment of growth retardent necessary. Purpose: form of chemical pinching (slow down headshoot, stimulating sideshoots).**
- 12. Not more than 18 hours of light.**
- 13. Natural Long Day: end march – half september.**

SHORT DAYS

1. 14 hours of darkness.
2. Natural Short Day: half september – half march.
3. 3d – 6th weeks: induction period.
4. Induction period: important growth retarding moment.
5. Length of short day: minimum 6 weeks.
6. Preference: short day till flowering/sales.
7. Light level under covering: < 10 lux is perfect.
8. Short day interruption not possible.
9. Interruption light: streetlanterns, neighboring greenhouses, the moon.
10. Not more than 10 hours of light.

SOIL

- 1. Must be airy.**
- 2. Must have draining capacity.**
- 3. Must have a storing capacity.**
- 4. pH 5.5 – 6.0.**
- 5. Choice of soil depends on growing system.**

ROOTING

- 1. Fill the pots with soil.**
- 2. Drench to pots, make them wet.**
- 3. Wait for half a day before sticking the cuttings**
- 4. No covering with plastic or tissue necessary (choice)**
- 5. No water for at least 7 days.**
- 6. If the soil dries out, just give a short shower.**
- 7. After 12 days, short normal irrigation and feeding.**

IRRIGATION

- 1. No misting in the Long Day period.**
- 2. Keep the culture moist, not wet.**
- 3. High frequency (every day a litte) is better than low frequency (once a week a lot).**
- 4. High temperatures: cooling off shower (specificly high noon).**
- 5. Too dry: antocyan (red coloring) on underside leaves.**
- 6. Too wet: drowning of rootes.**

FEEDING

1. **Ideal pH 5.8 (range 5.5 – 6.1)**
2. **EC Long Days: 0.7 ->1.0.**
3. **EC Short Days – induction: 1.0 -> 1.5.**
4. **EC Short Days – last weeks: 1.5 -> 1.0.**
5. **Hot conditions (over 76 degees F daytime): lower EC required.**
6. **Important elements: Calcium (Ca), Potassium (K), Phosfor (P), Nitrogen (N) and Magnesium (Mg).**

EC SCHEDULE CULTURE (BASIC IN POT)

Long Days			I	Short Days					flowering				
1	2	3	1	2	3	4	5	6	7	8	9	10	
EC pot 0.6-1.0				EC pot 1.0 – 1.5					EC pot 0.8 – 1.1				

1. in normal conditions decreasing the EC from the first period of the Short Day to the last period can take a couple of weeks.
2. when the temperature is high, over 28 degrees C outside, decreasing the temperature has to quicker.

CO²

1. Over 1100 ppm causes problems.
2. Under 400 ppm (natural level) means lack of growth.
3. Kalanchoe is a CAM (Crassulacean Acid Metabolism), which means it can take in CO² at night as well.
4. Apply CO² mainly at night in the first two weeks (rooting) and the last weeks (flowering).
5. Apply CO² mainly in the day in the last period of Long Days and the first period of Short Days (including induction).

LIGHT

1. **Critical daylength: 11,5 hours.**
2. **Daylength: minimum 13 hours, maximum 18 hours.**
3. **Natural light period: end march – half september.**
4. **Too much light: antocyan (red coloring) on leaves.**

LIGHTING

1. **Assimilation lights = grow light.**
2. **Cyclic light is not grow light: 10 minutes per half an hour.**
3. **Night break most ideal.**
4. **Start 2-3 hours after sunset, ending 2-3 hours before sunrise.**
5. **Minimum 15 Watt per m² (100 lux).**
6. **Distance light – plantlevel: 2-2,5 meter.**
7. **Daytime support light: maximum 10 hours.**

SHADING

1. **Summer: starting at 55.000 lux.**
2. **Spring: starting at 45.000 lux.**
3. **Calculate shading with starting point high noon (12 o'clock).**

**GROWTH RETARDENTS
(DAMINOZIDE)**

1. Powder – 3 hours waiting after making the solution.
2. Granulate and liquid – can be used directly.
3. In a concentrated form, never more than **142 gram per liter**.
4. Storage in cool and dark conditions (coolstore).
5. Preference: No mixing with other chemicals.
6. Check the pressure (bar) before spraying, can cause residu on leaves.
7. Every treatment give a 3-4 delay of the crop.
8. Crucial: mist treatment in Long Days, induction period in Short Days.
9. By preference spraying in the morning, most active period.
10. Moisty conditions better than dry conditions.
11. Give one hour after spraying a shower of water, this increases the effect.

**GROWTH RETARDENTS
(GENERAL)**

1. Some similar growth retardents are different on level of active ingredient. F.i. Bounty in Japan has approxametely 40 times more active ingredient than Bonzi.
2. Some growth retardents compete with the hormone responsible for making anthocyanide in the plant. Discoloring (to lighter colors) can be the result of that.
3. Some growth retardents has an influence on the level and/or stability of the pH in the pot.
4. Some growth retardents can be mixed together with comparable results. F.i. Daminozide and Cycocel.

SCHEDULE FOR ALAR/B-9 TREATMENT (Basic)

Long Days			Short Days									
1	2	3	1	2	3	4	5	6	7	8	9	10
↑ ↑		if necessary		↑ ↑ ↑			if necessary		flowering			
misting treatments		treatments during induction period										

Spraying methods

1. Misting treatment – Very light, low volume treatment. Only the top of the plant is treated, not the lower levels.
2. Spray treatment – Standard treatment, volume to run-off. All levels of the plant are treated.
3. Irrigation treatment – High volume treatment, run-off. A lot of fluid also ends up in the pot.

Long Day period

1. Slow growing varieties (Goldstrike): 0-1x misting treatment.
2. Normal growing varieties (Kerinci): 1-2x misting treatments.
3. Strong growing varieties (Tenorio): 2x misting treatments.

Short Day period (the induction period)

1. Varieties with a slow responstime(Goldstrike): spray treatments in the 5th and 6th week.
2. Varieties with a normal responstime (Tenorio): spray treatments in the 4th and 6th week.
3. Varieties with a quick responstime (Kerinci): spray treatments in the 3^d and 5th week.

DIFFERENCE BETWEEN B-9 & BONZI

B-9	Bonzi
1. Works mainly through leaves	1. Works mainly by roots
2. Starts working in 2-3 days	2. Starts working in 6-7 days
3. Works cumulative	3. Works every time seperate
4. Fixed rate	4. Rate depends on time of the year
5. Trustworthy for culture	5. Unreliable
6. Delay culture 3-4 days per treatment	6. Delay can be weeks with wrong rate
7. Overdose has no effect on flowers	7. Overdose destroys the flowers

CROP PROTECTION

- 1. No liquid chemicals, unless marked safe in cultural guides.**
- 2. No dusty chemicals allowed.**
- 3. With a scouting policy only curative treatments necessary.**
- 4. Be very careful with wetting agents.**
- 5. No cocktails with growth retardants.**
- 6. Avoid sprayments on opening buds and flowering plants.**
- 7. If a problem is treated, finish the schedule (especially with insects).**

BIOLOGICAL CONTROL

- 1. Determination of the problem.**
- 2. Scouting determines the action necessary.**
- 3. Climatical conditions important for biological controllers.**
- 4. Follow the schedule in detail: timing is important.**

MOTHERSTOCK CULTURE

1. Requirements roughly comparable with Long Day culture finished plants.
2. Different ages of motherplants requires different feeding levels.
3. Assimilation lighting required to bring uniformity throughout the year.
4. Early maintenance (e.g. pinching) of plants essential.
5. Maintenance throughout the culture (e.g. removing big leaves, misformed shoots etc) very important for production.
6. Scouting on diseased plants and plants which look different. If it looks different, remove it.
7. Harvesting by preference with a knife.
8. Harvesting cuttings always from the top of the plant – uniformity.
9. Harvesting cuttings on regular basis – at least once a week.
10. First three flushes – very heavy growing of cuttings.
11. Production after 7 months – cutting quality is decreasing.
12. The perfect cutting overall – 1 larger leafpair + 1 smaller leafpair + Top of the cutting.
13. Cutting too small (f.i. one bigger leafpair) is sensitive for fall-out, more difficult to root.
14. Cutting too big (f.i. with 3 large leafpairs) causing slower growth, less branching, sensitive for fall-out.
15. Selection checks and renewals by year.

CULTURE IN HIGH TEMPERATURES (OVER 90 degrees F)

DECORATIVE (CALANDIVA) CULTURE

- 1. Requirements roughly comparable with single flower culture.**
- 2. Long Days do have the same periods.**
- 3. Short Days must be at least 7 weeks.**
- 4. Culture is in average 1,5 week longer than single flower culture.**
- 5. The decoratives must have 14 hours of darkness for induction.**
- 6. The decoratives can stand a higher lightlevel.**

VERANDA CULTURE

- 1. Requirements roughly comparable with single flower culture.**
- 2. Suited for larger potsizes, 1 cutting in 5-7 inch pot.**
- 3. Long Days depending on potsize.**
- 4. Short Days must be at least 7 weeks.**
- 5. Culture is in average 1 week longer than single flower culture.**
- 6. No pinching.**
- 7. The Veranda's are ideal for outdoor use, but not all day in the full sun.**
- 8. Hardly no growth-retardents required.**

- 1. Try to cool down the plant at high noon with overhead water.**
- 2. Keep the soil moisty (not wet), to avoid cupping.**
- 3. Don't use cold water, below 50 degrees C, for this purpose.**
- 4. Fertilization level in the pot not over 1.0 EC.**
- 5. Try to keep some humidity in the greenhouse, at least 50%.**
- 6. Avoid too much direct sunlight, shading is very important.**
- 7. Start shading at 45.000 lux, to avoid cupping.**
- 8. Open the blackout clothing if possible, watch out for interfering light.**
- 9. Interfering light can also be the moon.**
- 10. Spraying in late night, very early morning.**
- 11. Act in time with growth-regulators, to avoid heat-stretching.**