

Forcing Guide / The cultivation of bulbous plants as pot plants

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1. ALLIUM

Plant: Allium karataviense

Family: Liliacea

Selection for pot production: Allium karataviense

Color: light purple-pink

Description

- Countries of origin: Central Asia
- Type of bulb/storage organ: true bulb
- Plant habit
 - height: 20 cm
 - inflorescence: globular with dozens of florets
 - flower shape: star-shaped
 - leaf color and shape: blue-grey, elliptical
- Dormancy-breaking requirements: by cold period, 9°C and colder
- Winter hardiness: good
- Methods of storage: 20°C, good air circulation and ventilation
- Period of availability: September - November
- Saleable sizes (cm)/flower number: 12/+ : 1 flower/bulb; 10/12: 1 flower/bulb

Programming for pot production

- Start of cold treatment: 15 October - 15 November
- Cold period in cold store/rooting room or standing ground: "wet cooling" (planted) for 20 - 21 weeks
- Cold temperature: root at 9°C, then, depending on shoot development, decrease to 5° then to 1°C (the same cold treatment as for tulips)
- No. of weeks cold treatment + earliest housing date
- Planting period: 15 October - 15 November
- Rooting medium : well-drained, moisture-retentive rooting medium or standard potting compost, pH ± 6 – 7
- Planting depth: 1 - 2 cm rooting medium on top of bulb
- Watering: plant in normal moist rooting medium, after planting water normally then no water until shoot emerges from bulb
- Standing ground : in regions with very low winter temperatures controlled temperature storage is necessary
- Use of standing ground: on the standing ground, cover pots with ± 5 cm soil over the noses
- Frost protection: ensure pots on/in standing ground are in good contact with the soil and cover with a layer of straw (min. 10 cm). During frosty periods also cover with thermal cover + on top extra layer of straw. Remove thermal cover and extra straw layer after frost
- Housing time: after cold treatment

Cultivation stage

- Fertiliser: none
- Greenhouse environment: 15 - 17°C; relative humidity (R.H.) 60 - 80%
- Light requirements: up to 350 joules/cm²/day, then shade
- Greenhouse period: 4 weeks
- Watering: normal

Marketing stage

- Storage temperature at producer's: 0 - 2°C
- Temperature in transit: 2 - 5°C; otherwise as cool as possible
- Storage temperature at wholesaler's or retailer's: 2 - 5°C; as above
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature in well-lit position
- Watering by customer: normal
- Keeping quality: very good; leaves wither at tips when in full bloom.

2. AMARCRINUM

Plant: Amarcrinum howardii

Family: Amaryllidaceae

Selection for pot production: Amarcrinum howardii

Color: pink

Description

- Countries of origin: United States of America (result of a cross between Amaryllis belladonna x Crinum moorei)
- Type of bulb/storage organ: tunicated bulb, more than 1 year old
- Plant habit
 - height: 80 cm
 - inflorescence: 15 - 25 flowers per stem, 1 to 2 stems per bulb
 - flower shape: trumpet-shaped
 - leaf color and shape: dark green; sword-shaped and numerous
- Dormancy-breaking requirements: cool and dry
- Winter hardiness: non-hardy
- Methods of storage: 5°C, in trays, well ventilated; R.H. 70%
- Period of availability: November - March
- Saleable sizes (cm)/flower number: 24/+0: 2 flower stems per bulb; 20/24: 1 flower stem per bulb

Programming for pot production

- Storage temperature prior to planting: 5°C, spacious and airy with low rate air circulation and ventilation; R.H. \pm 70%
- Planting period: January - March
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH 6 - 7
- No. of bulbs per pot: 1 - 3 bulbs per pot, pot size dependent on bulb size
- Planting depth: 1/3 of nose above soil
- Watering: immediately after planting water generously, then very little until shoot emerges from bulb
- Housing time: after planting

Cultivation stage

- Fertilizer: none
- Greenhouse environment: 8 - 13°C, as cool as possible in summer
- Light requirements: up to 1,000 joules/cm²/day, then shade
- Greenhouse period: 6 - 7 months
- Watering: generously until flowering, dry when finished flowering

Marketing stage

- Storage temperature at producer's: 5°C, light
- Temperature in transit: 5°C
- Storage temperature at wholesaler's or retailer's: 15°C and very light
- Suitable domestic location: living room, patio/balcony, garden
- Use as: tub plant
- Temperature at customer's: room temperature or outdoors, both in well-lit position; can be planted out in garden after flowering, cover against frost. In cold climates, bring indoors
- Watering by customer: moderate
- Keeping quality: very good

3. AMARYLLIS

Plant: Amaryllis belladonna

Family: Amaryllidaceae

Selection for pot production: Amaryllis belladonna

Colors: white, pink, pink/white

Description

- Countries of origin: South Africa (Cape Province)
- Type of bulb/storage organ: tunicated bulb, more than 1 year old
- Plant habit
 - height: 40 - 50 cm
 - inflorescence: 5 - 12 flowers per stem, 1 to 2 stems per bulb
 - flower shape: trumpet-shaped
 - leaf color and shape: dark green; linear, parallel-veined
- Dormancy-breaking requirements: none
- Winter hardiness: non-hardy
- Methods of storage: 5°C, in trays, little air ventilation; R.H. 70%
- Period of availability: August - March
- Saleable sizes (cm)/flower number: 24/+0: 2 flower stems per bulb; 20/24: 1 flower stem per bulb; 18/20: 1 flower stem per bulb

Programming for pot production

- Storage temperature awaiting planting: 5°C, spacious and airy with low rate air circulation and ventilation; R.H. \pm 70%
- Planting period: August - March
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH 6 - 7
- No. of bulbs per pot: 1 - 3 bulbs per pot, pot size dependent on bulb size
- Planting depth: 5 cm soil over nose
- Watering: immediately after planting water normally, then not until shoot emerges from bulb
- Housing time: after planting

Cultivation stage

- Fertiliser: none
- Greenhouse environment: cold but not below freezing
- Light requirements: maximum light
- Greenhouse period: 9 - 8 months
- Watering: moderate

Marketing stage

- Storage temperature at producer's: 5°C, light
- Temperature in transit: 5 - 10°C
- Storage temperature at wholesaler's or retailer's: cool and light
- Suitable domestic location: living room, patio/balcony, garden
- Use as: tub plant
- Temperature at customer's: room temperature and outdoors, both in well-lit position; may be planted out in garden after flowering, cover to protect from frost. In cold climates, bring indoors
- Watering by customer: moderate
- Keeping quality: very good

4. ANEMONE

Plant: Anemone blanda

Family: Ranunculaceae

Selection for pot production:

Anemone blanda 'Blue Shades'	Blue
Anemone blanda 'Charmer'	Pink
Anemone blanda 'Pink Star'	pink with white centre
Anemone blanda 'White Splendour'	white, underside pale lilac pink

Description

- Countries of origin: Southern Eastern Europe, Caucasus, Western Turkey
- Type of bulb/storage organ: tuber
- Plant habit
 - height: 10 - 15 cm
 - inflorescence: 3 - 5 flowers per plant
 - flower shape: saucer-shaped
 - leaf color and shape: green; deeply lacinate and fern-shaped
- Dormancy-breaking requirements: by cold treatment, 9°C and colder
- Winter hardiness: good
- Methods of storage: 13°, little air circulation and ventilation.
- Preventing desiccation: use peat litter or sawdust as filler or a bulb coating
- Period of availability: September - November
- Saleable sizes (cm)/flower number: 6/7: 4 flowers per tuber; 5/6: 3 flowers per tuber

Programming for pot production

- Start of cold treatment: 15 September - November
- Cold period in cold store/rooting room or standing ground: "wet cooling" (planted) for 15 weeks
- Cold temperature: root at 9°C, then, depending on shoot development, decrease to 5° then to 1°C (the same cold treatment as for tulips)
- Planting period: -early October* - early November; * for outdoors, planting period is dependent on soil temperature (max. 9°C) well-drained, Rooting medium moisture-retentive rooting medium or standard potting compost, pH ± 6 – 7
- Planting depth: top of tuber not visible or cover with a thin layer of cork 1 - 2 cm thick
- Watering: plant in normal moist rooting medium; no extra water. Root at a high R.H. (90%)
- Standing ground: in regions with very low winter temperatures controlled temperature storage is necessary
- Use of standing ground: on the standing ground, cover pots with ± 1 cm soil over the noses
- Frost protection: ensure pots on/in standing ground are in good contact with the soil and cover with a layer of straw (min. 10 cm). During frosty periods also cover with thermal cover + on top extra layer of straw. Remove thermal cover and extra straw layer after frost
- Housing time: after cold treatment

Cultivation stage

- Fertilizer: none
- Greenhouse environment: 5 - 12°C; R.H. 60 - 80%
- Light requirements: up to 350 joules/cm²/day, then shade
- Greenhouse period: 3 - 2 weeks
- Watering: moderate, do not allow compost to dry out

Marketing stage

- Storage temperature at producer's: 0 - 2°C; if not possible, then cool and light
- Temperature in transit: 2 - 5°C; as above
- Storage temperature at wholesaler's or retailer's: 2 - 5°C; as above
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature in well-lit position
- Watering by customer: moderate
- Keeping quality: good

5. CANNA

Plant: Canna

Family: Cannaceae

Selection for pot production: Canna (dwarf cultivars)

Colors: yellow, pink, red, white, lilac, orange in various combinations and also speckled

Description

- Countries of origin: South and Central America, Asia
- Type of bulb/storage organ: rather tuber-like rhizome
- Plant habit
 - height: 45 - 60 cm
 - inflorescence: spike
 - flower shape: tubular
 - leaf color and shape: green or brown; lanceolate
- Dormancy-breaking requirements: none
- Winter hardiness: non-hardy
- Methods of storage: in sand or barely moist peat litter at 5 - 10°C and after January 10°C, very little or no air circulation or ventilation
- Period of availability: November - May
- Saleable sizes/flower number: : 2 - 3 flower stems; II: 1 - 2 flower stems

Programming for pot production

- Storage temperature awaiting planting: 5 - 10°C and after January 10°C, must not dry out
- Planting period: January - May
- Rooting medium : well-drained, moisture-retentive rooting medium or standard potting compost, pH 6 - 7
- Planting depth: 2 - 3 cm over the rhizome, preferably 8 cm underneath
- Watering: plant in normal moist rooting medium, water lightly after planting, taking care not to over water
- Housing time: after planting
- Cultivation stage
- Fertiliser: light basic fertilization
- Greenhouse environment: 20°C; R.H. 60 - 80%
- Light requirements: up to 1,000 joules/cm²/day, then shade
- Greenhouse period: 12 - 16 weeks
- Watering: normal, the more leaves, the more water

Marketing stage

- Storage temperature at producer's: 10°C; if not possible, then cool and light
- Temperature in transit: 10°C; as above
- Storage temperature at wholesaler's or retailer's: 10°C; as above
- Suitable domestic location: patio/balcony, garden
- Use as: pot or tub plant
- Temperature at customer's: outdoors on patio/balcony in very sunny Watering by customer water well
- Keeping quality: excellent

6. CHIONODOXA

Plant: Chionodoxa forbesii; Chionodoxa luciliae

Family: Liliacea

Selection for pot production:

Chionodoxa forbesii	Blue, white centre
Chionodoxa forbesii 'Pink Giant'	Pink
Chionodoxa luciliae	Lavender blue, white centre
Chionodoxa luciliae 'Alba'	White

Description

- Countries of origin: Turkey, Crete
- Type of bulb/storage organ: true bulb, tunicated
- Plant habit
 - height: 15 - 20 cm
 - inflorescence: several stems per bulb, 5 - 7 florets per stem
 - flower shape: petals fasciate at base
 - leaf color and shape: dark green; narrow, quite thick and firm
- Dormancy-breaking requirements: by cold treatment, 9°C and colder
- Winter hardiness: good
- Methods of storage: 20°C, from 1 October 17°C, good air circulation and ventilation.
- Preventing desiccation: sawdust as filler
- Period of availability: August - December
- Saleable sizes (cm)/flower number: 5/+ : 1 - 1,5 flower stems per bulb

Programming for pot production

- Start of cold treatment: from early November and later
- Cold period in cold store/rooting room or standing ground: "wet cooling" (planted) for 15 weeks
- Cold temperature: 9°C for 4 weeks for rooting, then, depending on shoot development, decrease to 5° then to 1°C (the same cold treatment as for tulips)
- No. of weeks cold treatment + earliest housing date
- Planting period: early November - 15 December
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH ± 6 - 7
- Planting depth: nose just visible
- Watering: plant in normal moisture-retentive rooting medium, after planting water normally
- Standing ground: in regions with very low winter temperatures controlled temperature storage is necessary
- Use of standing ground: on the standing ground, cover pots with ± 5 cm soil over the noses
- Frost protection: ensure pots on/in standing ground are in good contact with the soil and cover with a layer of straw (min. 10 cm). During frosty periods also cover with thermal cover + on top extra layer of straw. Remove thermal cover and extra straw layer after frost
- Housing time: after cold treatment

Cultivation stage

- Fertilizer: none
- Greenhouse environment: 12° C; R.H. 60 - 80%
- Light requirements: up to 350 joules/cm²/day, then shade
- Greenhouse period: 3 - 2 weeks
- Watering: moderate; soil must not dry out

Marketing stage

- Storage temperature at producer's: 0 - 2°C; or if not possible, cool and light
- Temperature in transit: 2 - 5°C; as above
- Storage temperature at wholesaler's or retailer's: 2 - 5°C; as above
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature in a light position
- Watering by customer: moderate
- Keeping quality: moderate

7. CONVALLARIA

Plant: Convallaria majalis

Family: Liliacea

Selection for pot production: Convallaria majalis

Color: white

Description

- Countries of origin: North and Central Europe, Eastern Asia and North America
- Type of bulb/storage organ: rhizome with leaf (1 year-old) or flower shoots (2 year-old)
- Plant habit
 - height: 15 - 20 cm
 - inflorescence: 8 - 15 flowers per stem
 - flower shape: bell-shaped
 - leaf color and shape: green; lanceolate
- Dormancy-breaking requirements: by cold treatment, -2°C
- Winter hardiness: good
- Methods of storage: October - December +2°C, December - March +0°C, then -2°C in plastic bag with slightly moist potting compost
- Period of availability: all year round
- Saleable sizes/flower number: I: 1 flower stem

Programming for pot production

- Start of cold treatment: after harvesting
- Cold period in cold store/rooting room or standing ground: at least 8 weeks
- Cold temperature: -2°C
- Storage temperature awaiting planting: 0 - 2°C for a few days at most
- Planting period: January - December
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH ± 5 - 7
- Planting depth: nose 1 cm above the rooting medium/compost
- Watering: for plants in normal moist rooting medium, water normally after planting
- Housing time: after planting

Cultivation stage

- Fertilizer: none
- Greenhouse environment: 25 - 20°C, air circulation; R.H. 80 - 90%
- Light requirements: up to 600 joules/cm²/day, then shade
- Greenhouse period: 3 - 2 weeks
- Watering: plentiful

Marketing stage

- Storage temperature at producer's: 2 - 5°C; if not possible, then cool and light
- Temperature in transit: 5°C; as above
- Storage temperature at wholesaler's or retailer's: 5°C; as above
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature in a light position, but no direct light
- Watering by customer: moderate
- Keeping quality: very good

8. CROCUS

Plant: *Crocus flavus*; *Crocus vernus*

Family: Iridaceae

Selection for pot production:

<i>Crocus flavus</i> 'Golden Yellow'	Yellow
<i>Crocus vernus</i> 'Flower Record'	Purple
<i>Crocus vernus</i> 'Jeanne d'Arc'	White
<i>Crocus vernus</i> 'Pickwick'	Blue, white striped
<i>Crocus vernus</i> 'Remembrance'	Blue

Description

- Countries of origin: *Crocus flavus*: Balkans and North West Turkey; *Crocus vernus*: Pyrenées and Alps
- Type of bulb/storage organ: corm
- Plant habit
 - height: 15 cm
 - inflorescence: single-flowered, often two flowers per sprout
 - flower shape: round or elliptical
 - leaf color and shape: green; sword-shaped
- Dormancy-breaking requirements: by cold treatment, 9°C and colder
- Winter hardiness: hardy
- Methods of storage: 20°C, from 1 October 17°C, good air circulation and ventilation. Control mice!
- Period of availability: August - 15 November
- Saleable sizes (cm)/ flower number: *Crocus flavus*; 10/+0: 4 - 5 flowers per corm; 9/10: 3 - 4 flowers per corm; 8/90: 2 - 3 flowers per corm; *Crocus vernus*; 10/+0: 5 - 6 flowers per corm; 9/10: 4 - 5 flowers per corm; 8/90: 3 - 4 flowers per corm

Programming for pot production

- Start of cold period: from about 25 August - September and later
- Cold period in cold store/rooting room or standing ground: 15 weeks, of which max. 2 weeks may be "dry cooling" at 9°C
- Cold temperature: 9°C (min. 6 weeks before roots reach bottom of pot) and, depending on sprout length, decrease slowly to 7 - 5 - 2 and 0°C (the same cold treatment as for tulips)
- Corm size: for early flowering, a large corm, thereafter any corm size
- Planting period: mid September to early November
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH ± 6 - 7
- Planting depth: top of corm not visible or cover with 1 cm compost
- Watering: normal moisture
- Standing ground: in regions with very low winter temperatures controlled temperature storage is necessary
- Use of standing ground: cover pots on/in standing ground with approx. 5 cm soil over corms. Control mice!

- Frost protection: ensure pots on/in standing ground are in good contact with the soil and cover with a layer of straw (min. 10 cm). During frosty periods also cover with thermal cover + on top extra layer of straw. Remove thermal cover and extra straw layer after frost
- Housing time: after cold treatment

Cultivation stage

- Fertilizer: none
- Greenhouse climate: 12 - 18°C; R.H. 70 - 80%
- Light requirements: up to 350 joules/cm²/day, then shade
- Greenhouse period: 3 - 1 week
- Watering: keep normally moist

Marketing stage

- Storage temperature at producer's: 0 - 2°C
- Temperature in transit: 2 - 5°C
- Storage temperature at wholesaler's or retailer's: 2 - 5°C
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature, preferably in a cool and well-lit position
- Watering by customer: moderate
- Keeping quality: good, if several flowers open (large corm sizes)

9. CYRTANTHUS

Plant: Cyrtanthus

Family: Amaryllidaceae

Selection for pot production:

Cyrtanthus

Color: red, pink, white

Description

- Countries of origin: Southern and Eastern Africa
- Type of bulb/storage organ: tunicated bulb, more than 1 year old
- Plant habit
 - height: 40 - 50 cm
 - inflorescence: 4 - 8 flowers per stem, 2 to 3 stems per bulb
 - flower shape: trumpet
 - leaf color and shape: green; linear, parallel-veined
- Dormancy-breaking requirements: keep cool and dry
- Winter hardiness: non-hardy
- Methods of storage: 13°C, in trays, well air ventilated; R.H. 70%
- Period of availability: August - March
- Saleable sizes (cm)/flower number: white, 16/+ : 2 flower stems per bulb; red, 14/+ : 2 flower stems per bulb; pink, 12/+ : 2 flower stems per bulb

Programming for pot production

- Storage temperature awaiting planting: do not delay; plant immediately!
- Planting period: August - March
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH 6 - 7
- No. of bulbs per pot: 1 - 3 bulbs per pot, pot size dependent on bulb size
- Planting depth: 1/3 of nose above soil
- Watering: immediately after planting water normally, then wait until shoot emerges from bulb
- Housing time: after planting

Cultivation stage

- Fertilizer: a light fertilization may be given
- Greenhouse climate: cold frame, min. 5°C; R.H. 60 - 80%
- Light requirements: 350 joules/cm²/day, from 800 shade
- Greenhouse period: 6 months
- Watering: normal until stems appear, then water generously, after flowering cease watering until Spring

Marketing stage

- Storage temperature at producer's: 10 - 12°C; light
- Temperature in transit: 5°C
- Storage temperature at wholesaler's or retailer's: 10 - 14°C and good light
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot or tub plant
- Temperature at customer's: room temperature, no direct sunlight; may be planted out in garden until Autumn after flowering; outdoors in shade
- Watering by customer: moderate
- Keeping quality: very good

10. DAHLIA

Plant: Dahlia

Family: Compositae

Selection for pot production:

Dahlia 'Dahlinova' (various cultivars)

Dahlia 'Gallery'

Dahlia (compact-growing cultivars up to 60 - 80 cm from the various groups)

Color: various colors

Description

- Countries of origin: Mexico, Central America
- Type of bulb/storage organ: tuber
- Plant habit
 - height: 25 - 60 cm
 - inflorescence: 'Dahlinova' and 'Gallery': many flowers; others: 5 - 7 flowers per plant
 - flower shape: saucer-shaped to globular
 - leaf color and shape: green to bronze; elliptical
- Dormancy-breaking requirements: none
- Winter hardiness: non-hardy
- Methods of storage: 7 - 10°C, unventilated and with little air circulation. Preventing desiccation: slightly moist peat litter as filler can be used
- Period of availability: November - March
- Saleable sizes/flower number: I I : many or 5 - 7 flowers; II: many or 5 - 7 flowers

Programming for pot production

- Planting period: mid January - June
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH ± 7
- No. of tubers per pot: 1 tuber per pot, pot size dependent on cultivar and tuber size
- Planting depth: collar not visible, top of collar level with rim of pot
- Watering: plants in normal rooting medium: water well after planting
- Housing time: after planting

Cultivation stage

- Fertilizer: controlled-release fertilizer (14-14-14); if necessary repeat via irrigation system
- Greenhouse climate (or outdoors): daytime temperature 23 - 25°C, night temperature 17 - 18°C; R.H. 60 - 80%
- Light requirements: up to 1,000 joules/cm²/day, shade from mid-April; desirable day length: vegetative growth 10 - 12 hours, generative growth 12 - 14 hours
- Stem shoots: any runners from old stems should be removed
- Topping: plants with 1 - 2 shoots should be stopped above the 2nd or 3rd leave bud; if more than 3 - 4 shoots, remove the rest
- No. of pots per m²: pot thick, after 5 - 6 weeks give more space
- Greenhouse period: 8 - 12 weeks
- Watering: keep compost normally moist, from start of flowering increase water; keep foliage dry!

Marketing stage

- Storage temperature at producer's: lower greenhouse temperature to 10 - 13°C
- Temperature in transit: 13 - 16°C
- Storage temperature at wholesaler's or retailer's: 16 - 21°C in good light
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature in a well-lit or very well-lit position, normal for patio or balcony
- Watering by customer: normal
- Keeping quality: excellent; remove over mature flowers

11. ERANTHIS

Plant: *Eranthis cilicica*; *Eranthis hyemalis*

Family: Ranunculaceae

Selection for pot production:

Eranthis cilicica

Eranthis hyemalis

Color: yellow

Description

- Countries of origin: *Eranthis cilicica*: Greece, Turkey; *Eranthis hyemalis*: Western Europe
- Type of bulb/storage organ: brownish-black tuber
- Plant habit
 - height: about 10 cm
 - inflorescence: flower with green leaf collaret underneath
 - flower shape: buttercup-shaped
 - leaf color and shape: bronze-green; no stem, lacinate and rosette-shaped
- Dormancy-breaking requirements: by cold treatment, 9°C and colder
- Winter hardiness: very hardy
- Methods of storage: 5 - 9°C, stored loosely in trays in sawdust if wished
- Period of availability: August - November
- Saleable sizes (cm)/flower number: *Eranthis cilicica* 4/+ : 2 - 3 flowers; *Eranthis hyemalis* 5/+ : 3 - 4 flowers; 4/5 : + 2 flowers

Programming for pot production

- Start of cold period: from 15 September or later
- Cold period in cold store/rooting room or standing ground: 13 - 15 weeks, of which 4 weeks may be "dry cooling" weeks
- Cold temperature: "dry cooling" 9°C; "wet cooling" at least 4 weeks at 9°C for rooting, then, between 9° and 1°C (the same cold treatment as for tulips)
- Planting period: mid September - November
- Rooting medium: -well-drained, moisture-retentive rooting medium or standard potting compost + extra sand, pH ± 6 - 7
- Planting depth: 1 cm over tuber
- Watering: normal
- Standing ground: -in regions with very low winter temperatures controlled temperature storage is necessary
- Use of standing ground: cover pots on/in standing ground with approx. 5 cm soil over tubers
- Frost protection: ensure pots on/in standing ground are in good contact with the substrate and cover with a layer of straw (min. 10 cm). During frosty periods also cover with thermal cover + on top extra layer of straw. Remove thermal cover and extra straw layer after frost
- Housing time: after cold treatment

Cultivation stage

- Fertilizer: none
- Greenhouse climate: 10 - 12°C; R.H. 60 - 80%
- Light requirements: up to 350 joules/cm²/day, then shade
- Greenhouse period: 3 - 1 week
- Watering: normal to moderate

Marketing stage

- Storage temperature at producer's: 0 - 2°C; if not possible, then cool and light
- Temperature in transit: 2 - 5°C; as above
- Storage temperature at wholesaler's or retailer's: 2 - 5°C; as above
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature in a well-lit position
- Watering by customer: moderate
- Keeping quality: moderate

12. EUCOMIS

Plant: *Eucomis autumnalis*; *Eucomis bicolor*

Family: Liliaceae

Selection for pot production:

<i>Eucomis autumnalis</i>	white, small flowers
<i>Eucomis bicolor</i>	greenish yellow with purple sheen and spots

Description

- Countries of origin: South Africa, Zimbabwe, Malawi
- Type of bulb/storage organ: true bulb, tunicated
- Plant habit
 - height: *Eucomis autumnalis*: 20 cm; *Eucomis bicolor*: 60 cm
 - inflorescence: spikes closely surrounded by flowers
 - flower shape: star-shaped
 - leaf color and shape: green (*Eucomis autumnalis*) and dark green (*Eucomis bicolor*), often marbled; bent and ribbon-like with wavy edges
- Dormancy-breaking requirements: heat treatment, 14°C or above
- Winter hardiness: non-hardy
- Methods of storage: about 9 - 13°C, dry in trays
- Period of availability: December - April
- Saleable sizes (cm)/flower number: *Eucomis autumnalis*: 16/+, 14/16, 12/14 and 10/12: 1 flower per bulb; *Eucomis bicolor*: 20/+, 18/20, 16/18 and 14/16: 1 flower per bulb

Programming for pot production

- Planting period: mid March to mid April
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH ± 6 - 7
- No. of bulbs per pot: 1 bulb per pot, pot size dependent on bulb size
- Planting depth: 0 - 3 cm soil over bulb
- Watering: plant in normal moist rooting medium, after planting water normally, then not again until shoot emerges from bulb
- Housing time: after planting

Cultivation stage

- Fertilizer: none
- Greenhouse environment: 16 - 20°C; R.H. 75 - 80%
- Light requirements: up to 600 joules/cm²/day, then shade
- Greenhouse period: 6 - 3 weeks
- Watering: moderate

Marketing stage

- Storage temperature at producer's: $\pm 10^{\circ}\text{C}$; or if not possible, cool and well-lit
- Temperature in transit: $\pm 10^{\circ}\text{C}$; as above
- Storage temperature at wholesaler's or retailer's: $10 - 13^{\circ}\text{C}$, as above
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot or tub plant
- Temperature at customer's: normal in a well-lit position
- Watering by customer: little to normal
- Keeping quality: excellent, after flowering the seed heads remain decorative

13. FRITILLARIA MICHAILOVSKYI

Plant: *Fritillaria michailovskyi*

Family: Liliaceae

Selection for pot production: *Fritillaria michailovskyi*

Color: brown with yellow edge

Description

- Countries of origin: North East Turkey
- Type of bulb/storage organ: tunicated bulb, pale yellow in color
- Plant habit
 - height: 10 - 15 cm
 - inflorescence: 1 - 4 flowers per stem
 - flower shape: bell-shaped pendant flowers
 - leaf color and shape: green; elliptical
- Dormancy-breaking requirements: cold period, 9°C or colder
- Winter hardiness: good
- Methods of storage: 20°C up to 1 September, followed by 17°C; moderate air circulation and ventilation. Preventing desiccation: use sawdust or vermiculite mixed with potting compost as filler, newspaper may be placed on the base of the mesh tray or a bulb coating used
- Period of availability: August - September
- Saleable sizes (cm)/flower number: 7/+ : 1 stem with 2 - 4 flowers; 5/7 : 1 stem with 1 - 3 flowers

Programming for pot production

- Start of cold period: from 15 September to mid October
- Cold period in cold store/rooting room or standing ground: 20 weeks "wet cooling" (planted). Cold treatment may be extended without causing problems
- Cold temperature: 9°C reducing to 1°C, or the same as for tulips (perhaps + 0°C for late flowering)
- No. of weeks cold treatment + earliest housing date
- Planting period: 15 September to 15 October
- Rooting medium: standard potting compost + extra sand, pH ± 6 - 7
- Planting depth: ± 1 cm soil over bulb
- Watering: normal
- Standing ground: -in regions with very low winter temperatures controlled temperature storage is necessary
- Use of standing ground: cover pots on/in standing ground with 2 - 3 cm soil over the noses
- Frost protection: ensure pots on/in standing ground are in good contact with the soil and cover with a layer of straw (min. 10 cm). During frosty periods also cover with thermal cover + on top extra layer of straw. Remove thermal over and extra straw layer after frost
- Housing time: after cold treatment

Cultivation stage

- Fertilizer: none
- Greenhouse environment: 12°C; R.H. 60 - 80%
- Light requirements: up to 350 joules/cm²/day, then shade
- Greenhouse period: 4 - 3 weeks
- Watering: normal

Marketing stage

- Storage temperature at producer's: 0 - 2°C; if not possible, then cool and well-lit
- Temperature in transit: 2 - 5°C; as above
- Storage temperature at wholesaler's or retailer's: 2 - 5°C; as above
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature in a well-lit position
- Watering by customer: moderate
- Keeping quality: good

14. FRITILLARIA

Plant: Fritillaria meleagris

Family: Liliaceae

Selection for pot production:

Fritillaria meleagris	White/purple
Fritillaria meleagris 'Alba'	White

Description

- Countries of origin: North West Europe
- Type of bulb/storage organ: tunicated bulb, creamy white in Color
- Plant habit
 - height: 15 - 30 cm
 - inflorescence: 1 - 3 flowers per stem
 - flower shape: bell-shaped
 - leaf color and shape: green; elongated
- Dormancy-breaking requirements: by cold treatment, 9°C or colder
- Winter hardiness: good
- Methods of storage: 13°C; no air circulation and moderate ventilation. Preventing desiccation: use sawdust or vermiculite mixed with potting compost as filler or a bulb coating
- Period of availability: August - September
- Saleable sizes (cm)/flower number: 7/8: 1.5 stems with 1.5 - 2 flowers per stem; 6/7: 1 stem with 1 - 1.5 flowers per stem

Programming for pot production

- Start of cold period: from 1 September to early October
- Cold period in cold store/rooting room or standing ground: 13 - 17 weeks "wet cooling" (planted) which may be extended without causing problems
- Cold temperature: 5°C
- Planting period: from 1 September to early October
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH ± 6 - 7
- Planting depth: ± 1 cm compost over bulb
- Watering: normal
- Standing ground: -in regions with very low winter temperatures controlled temperature storage is necessary
- Use of standing ground: cover pots on/in standing ground with 2 - 3 cm soil over the noses
- Frost protection: ensure pots on/in standing ground are in good contact with the soil and cover with a layer of straw (min. 10 cm). During frosty periods also cover with thermal cover + on top extra layer of straw. Remove thermal cover and extra straw layer after frost
- Housing time: after cold treatment

Cultivation stage

- Fertilizer: none
- Greenhouse environment: 17 - 20°C; R.H. 60 - 80%
- Light requirements: up to 350 joules/cm²/day, then shade
- Greenhouse period: 3 - 2 weeks
- Watering: normal, soil must not dry out

Marketing stage

- Storage temperature at producer's: 0 - 2°C; if not possible, then cool and well-lit
- Temperature in transit: 2 - 5°C; as above
- Storage temperature at wholesaler's or retailer's: 2 - 5°C; as above
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature in a well-lit position
- Watering by customer: moderate
- Keeping quality: good

15. GALANTHUS

Plant: *Galanthus elwesii*; *Galanthus nivalis*

Family: Amaryllidaceae

Selection for pot production:

<i>Galanthus elwesii</i>	white; single-flowered
<i>Galanthus nivalis</i>	white; single-flowered
<i>Galanthus nivalis</i> 'Flore Pleno'	white; double-flowered

Description

- Countries of origin: Europe, Western Asia, Caucasus
- Type of bulb/storage organ: tunicated true bulb
- Plant habit
 - height: 10 - 20 cm
 - inflorescence: 1 single or double flower per stem
 - flower shape: bell-shaped
 - leaf color and shape: grey-green (*Galanthus nivalis*) or bluish green; linear
- Winter hardiness: good
- Saleable sizes (cm)/flower number: 6/+ : 1 flower per bulb; 5/6 : 0.8 - 1 flower per bulb; *Galanthus elwesii*: 7/+ : 1 flower per bulb; 6/7 : 0.8 - 1 flower per bulb
- Period of availability: June - September
- Methods of storage: cool 15°C. Preventing desiccation: store preferably in sand

Programming for pot production

- Beginning of cold period: mid September - October
- Cold period in cold store/rooting room or standing ground: 15 weeks "wet cooling" (planted)
- Cold temperature: 9°C, then, depending on shoot development, decrease to 5° then to 1°C (the same cold treatment as for tulips)
- Planting period: mid September to mid October
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost + extra sand, pH 6 - 7
- Planting depth: nose just visible
- Watering: normal (after planting in normal moist rooting medium water pots lightly)
- Standing ground: -in regions with very low winter temperatures controlled temperature storage is necessary
- Use of standing ground: cover pots on/in standing ground with ± 2 cm soil over the noses
- Frost protection: ensure pots on/in standing ground are in good contact with the soil and cover with a layer of straw (min. 10 cm). During frosty periods also cover with thermal cover + on top extra layer of straw. Remove thermal c cover and extra straw layer after frost
- Housing time: after cold treatment

Cultivation stage

- Fertilizer: none
- Greenhouse environment: 8 - 10°C (as cold as possible); R.H. 60 - 80%
- Light requirements: up to 350 joules/cm²/day, then shade
- Greenhouse period: 4 - 2 weeks
- Watering: moderate; do not let compost dry out

Marketing stage

- Storage temperature at producer's: 0 - 2°C; if not possible then cool and light
- Temperature in transit: 2 - 5°C; as above
- Storage temperature at wholesaler's or retailer's: 2 - 5°C; as above
- Suitable domestic location: living room (moderate), patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature and in well-lit position
- Watering by customer: moderate
- Keeping quality: moderate to good (outdoors)

16. HIPPEASTRELIA

Plant: Hippeastrelia

Family: Amaryllidaceae

Selection for pot production: Hippeastrelia 'Red Beauty'

Color: red

Description

- Countries of origin: United States of America (product of a crossing between Hippeastrum and Sprekelia)
- Type of bulb/storage organ: tunicated bulb, more than 1 year old
- Plant habit
 - height: 30 cm
 - inflorescence: 2 - 3 flowers per stem, 1 - 2 stems per bulb
 - flower shape: trumpet-shaped
 - leaf color and shape: dark green; linear, parallel-veined
- Dormancy-breaking requirements: cold period
- Winter hardiness: non-hardy
- Methods of storage: 5°C, in trays, little air ventilation; R.H. 70%
- Period of availability: November - March
- Saleable sizes (cm)/flower number: 18/+ : 2 flower stems per bulb; 16/18: 1 - 2 flower stems per bulb; 14/16: 1 flower stem per bulb

Programming for pot production

- Storage temperature prior to planting: 5°C, spacious and airy with low rate air circulation and ventilation
- Planting period: December - April
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH 6 - 7
- No. of bulbs per pot: 1 - 3 bulbs per pot, pot size dependent on bulb size
- Planting depth: 1/3 nose above compost
- Watering: immediately after planting water generously, then wait until shoot emerges from bulb
- Housing time: after planting

Cultivation stage

- Fertilizer: none
- Greenhouse environment: 12 - 17°C; R.H. 70 - 80%
- Light requirements: 1,000 joules/cm²/day
- Greenhouse period: 3 - 6 weeks
- Watering: plentiful

Marketing stage

- Storage temperature at producer's: 5°C
- Temperature in transit: 5°C
- Storage temperature at wholesaler's or retailer's: 10 - 15°C
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot or tub plant
- Temperature at customer's: room temperature and in well-lit position; can be planted outdoors up to Autumn after flowering, cover to protect from frost. In cold climates, bring indoors
- Watering by customer: moderate
- Keeping quality: good

17. HIPPEASTRUM

Plant: Hippeastrum (syn. Amaryllis)

Family: Amaryllidaceae

Selection for pot production:

Hippeastrum (large-flowered)

Hippeastrum (double-flowered)

Hippeastrum (small-flowered)

Color: wide range of colors

Description

- Countries of origin: South America
- Type of bulb/storage organ: tunicated bulb, more than 1 year old bulb
- Plant habit
 - height: 40 - 80 cm
 - inflorescence: 4 - 6 flowers per stem, 1 - 3 stems per bulb
 - flower shape: trumpet-shaped
 - leaf color and shape: green; linear, parallel-veined
- Dormancy-breaking requirements: (treatment for stem elongation) at 13 - 15°C
- Winter hardiness: non-hardy
- Methods of storage: after treatment for stem elongation 5°C; R.H 70%
- Period of availability: August (new harvest) - July
- Saleable sizes (cm)/flower number: Hippeastrum (large and double-flowered): 24/26: 1 flower stem, 28/30: 2 flower stems; Hippeastrum (small-flowered): 20/22: 1 flower stem, 24/26: 2 flower stems

Programming for pot production

- Extension treatment: after harvesting storage at 13 - 15°C; large-flowered: 10 - 12 weeks; double-flowered : 6 – 8 weeks; small-flowered: 4 - 6 weeks
- Storage temperature prior to planting: 5°C; allow plenty of space between bulbs with low rate air circulation and ventilation; R.H. ± 70%
- Advance preparation: store the bulbs before planting for 7 - 14 days with 25 - 28°C; R.H. 80 - 90%
- Planting period: all year round
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH 5.5 - 6.5
- No. of bulbs per pot: 1 bulb per pot, pot size dependent on bulb size
- Planting depth: 1/3 of bulb neck above soil
- Watering: immediately after planting water generously, then wait until shoot (leaf or bud) emerges from bulb
- Housing time: after planting

Cultivation stage

- Fertilizer: none
- Greenhouse environment: air temperature 21 - 27°C, soil temperature minimal 20 - 22°C; R.H. 60 - 80%
- Light requirements: first 2 weeks perhaps no light, then up to 350 joules/cm²/day, then shade
- Greenhouse period: Christmas flowering: 5* - 7 weeks; January - March flowering: 5* - 7 weeks; April - Autumn flowering: 3* - 4 weeks; * with advance preparation (see page 39)
- Watering: first 2 weeks moderate, then, when shoot or bud emerges from bulb, water regularly

Marketing stage

- Storage temperature at producer's: 10 - 12°C; light
- Temperature in transit: 10°C; light
- Storage temperature at wholesaler's or retailer's: 10 - 14°C; light
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot or tub plant
- Temperature at customer's: room temperature and in well-lit position; may be planted outdoors up to Autumn after flowering, cover to protect from frost. In cold climates, bring indoors
- Watering by customer: moderate
- Keeping quality: very good

18. HYACINTHUS

Plant: *Hyacinthus orientalis*

Family: Liliaceae

Selection for pot production:

Hyacinthus orientalis

blue: incl. 'Delft Blue'

pink: incl. 'Pink Pearl'

red: incl. 'Jan Bos'

violet: incl. 'Anna Liza'

white: incl. 'White Pearl'

orange: incl. 'Gypsy Queen'

Colors:

china blue

rose pink

deep carmine

purple

white

Description

- Countries of origin: Balkans and Asia Minor
- Type of bulb/storage organ: tunicated bulb
- Plant habit
 - height: 25 - 30 cm
 - inflorescence: cylindrical cluster of flowers
 - flower shape: bell-shaped
 - leaf color and shape: green; thick and ribbon-like
- Dormancy-breaking requirements: by cold period, 9 - 5°C
- Winter hardiness: poor
- Methods of storage: bulbs to flower up to 1 January: after Stage G 20°C, bulbs to flower after 1 January: 25°C + 4 weeks 20°C, good air circulation and ventilation
- Period of availability: late August - November
- Saleable sizes (cm)/flower number: 19/+ : 1 flower stem per bulb 18/19: as above; 17/18: as above; 16/17: as above

Programming for pot production

- Start of cold period: from about 5 September to November
- Cold period in cold store/rooting room or standing ground: 7 - 13 weeks depending on cultivar and desired flowering period and only after potting
- Cold temperature: September - October 9°C, November - December 9°C, depending on length of shoot, reduce to 7 - 5°C, January - March 9°C, depending on length of shoot reduce to 7 - 5 - 2°C. Compensate for early reduction! i.e. 1 week 1°C above 9°C or below 5°C extend cold period by 1 day
- Planting period: early September to November
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH ± 6 - 7
- Planting depth: 1/3 of the bulb in the compost

- After potting: to prevent the bulbs pushing themselves out of the pot use in the rooting room for the first 4 weeks racks, foam rubber mats or 1 cm clean white sand up to 1 cm over the bulb nose.
- Watering: rooting medium must be thoroughly moist
- Standing ground: in regions with very low winter temperatures controlled temperature storage is necessary
- Use of standing ground: cover pots on/in standing ground to about 10 - 15 cm and from February 8 cm soil over the noses
- Frost protection: ensure pots on/in standing ground are in good contact with the soil and cover with a layer of straw (min. 10 cm). During frosty periods also cover with thermal cover + on top extra layer of straw. Remove thermal cover and extra straw layer after frost
- Housing time: after cold treatment

Cultivation stage

- Fertilizer: none
- Greenhouse environment: up to 1 January 23 - 25°C, cultivars sensitive to "bent head" (e.g. Delft Blue) and Jan Bos: 18 - 17°C; R.H. 70% up to 1 February 23 - 20°C, after 1 February 23 - 18°C; R.H. 70%
- Light requirements: in very northerly areas light (35 - 150 Watt/m²) is given 24 hours a day to Christmas crops; daylight: up to 350 joules/cm²/day, then shade
- Greenhouse period: 2 - 1 weeks
- Watering: keep normal moisture, never on the plant

Marketing stage

- Storage temperature at producer's: space between florets then 2°C + air circulation; keep leaf and flower dry
- Temperature in transit: 2°C
- Storage temperature at wholesaler's or retailer's: 2°C
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature preferably in a cool and well-lit position
- Watering by customer: normal
- Keeping quality: good

19. IRIS

Plant: *Iris danfordiae*, *Iris histrioides* and *Iris reticulata*

Family: Iridaceae

Selection for pot production:

- *Iris danfordiae*
- *Iris histrioides* 'George'
- *Iris reticulata*
- 'Cantab'
- 'Harmony'
- 'Joyce'
- 'J.S. Dijt'
- 'Purple Gem'

Colors:

- golden yellow with green spots on lip
- purple
- violet blue with yellow honey guide
- pale blue with yellow honey guide
- sky blue with yellow honey guide
- sky blue with orange honey guide
- reddish purple with yellow honey guide
- violet purple

Description

- Countries of origin: *Iris danfordiae*: Eastern Turkey; *Iris histrioides*: Turkey; *Iris reticulata*: Caucasus, Asia Minor
- Type of bulb/storage organ: elliptical tunicated bulb
- Plant habit
- height: *Iris danfordiae* and *Iris histrioides*: 10 - 15 cm; *Iris reticulata*: 15 cm
- inflorescence: single-flowered
- flower shape: iris-shaped
- leaf color and shape: green; stiff, short leaf
- Winter hardiness: sensitive
- Saleable sizes (cm)/flower number: 6/+ : 1 - 2 flowers per bulb
- Period of availability: August - November
- Methods of storage: 25 - 23°C up to mid September, followed by 20 and 17°C

Programming for pot production

- Start of cold period: early September to 1 December
- Cold period in cold store/rooting room or standing ground: preferably "wet cooling" (planted) for 15 weeks. Prior
- "dry cooling" for another max. 2 weeks may be permitted to avoid *Penicillium*
- Cold temperature: 9°C, then depending on sprouting decreasing to 1 - 0°C (or the same cold treatment as for tulips)
- Planting period: September - 1 December
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH ± 6 - 7
- Planting depth: bulb tip not visible

- Watering: normal (after planting in normal moist rooting medium water pots lightly)
- Standing ground: in regions with very low winter –temperatures controlled temperature storage is necessary
- Use of standing ground: cover pots on/in standing ground with approx. 2 cm soil over noses
- Frost protection: ensure pots on/in standing ground are in good contact with the soil and cover with a layer of straw (min. 10 cm). During frosty periods also cover with thermal cover + on top extra layer of straw. Remove thermal cover and extra straw layer after frost
- Housing time: after cold treatment

Cultivation stage

- Fertilizer: none
- Greenhouse environment: 12°C; R.H. 60 - 80%
- Light requirements: up to 350 joules/cm²/day, then shade
- Greenhouse period: 2 - 1 weeks
- Watering: normal, do not let compost dry out

Marketing stage

- Storage temperature at producer's: 0 - 2°C; if not possible then cool and light
- Temperature in transit: 2 - 5°C; as above
- Storage temperature at wholesaler's or retailer's: 2 - 5°C; as above
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature, and in a well-lit position
- Watering by customer: normal
- Keeping quality: moderate

20. LILIUM

Plant: Lilium

Family: Liliaceae

Selection for pot production:

- Asiatic hybrids, including
 - 'Buff Pixie'
 - 'Butter Pixie'
 - 'Compass'
 - 'Denia'
 - 'Ivory Pixie'
 - 'Orange Pixie'
 - 'Partner'
- Oriental hybrids, including
 - 'Le Rêve'
 - 'Mr. Ruud'
 - 'Mr. Sam'
 - 'Star Gazer'
 - 'Mona Lisa'
- Longiflorum hybrids
 - 'White American'

Colors:

- Asiatic hybrids, including
 - salmon
 - golden yellow
 - orange-yellow
 - pink
 - ivory-yellow
 - orange-red
 - deep red
- Oriental hybrids, including
 - pink
 - white/yellow
 - red/cream
 - red/white
 - pink
- Longiflorum hybrids
 - white

Description

- Countries of origin: temperate zones of Northern hemisphere
- Type of bulb/storage organ: fleshy, scaly bulb, skinless
- Plant habit
- height: 35 - 80 cm
- inflorescence: single or double, cluster
- flower shape: saucer- or trumpet-shaped
- leaf color and shape: green; elliptical or lanceolate
- Dormancy-breaking requirements: by cold period, 2 - 5°C

- Winter hardiness: non-hardy
- Methods of storage: unfrozen bulbs for 1 - 2 weeks at 0 - 2°C, frozen bulbs may be stored at -0,5 to -2°C (depending on group and/or cultivar); little air circulation
- Period of availability: Asiatic hybrids: all year round, others: depending on cultivar; December - September to all year round
- Programming for pot production: Storage temperature prior to planting: 0 - 2°C, little air circulation; R.H. 90 - 95%,
- Planting period: depending on group and cultivar, December - January
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH ± 6 - 7, Oriental hybrids pH 5.5 - 6.5
- Planting method: 1 - 2 cm potting compost under and preferably 5 cm over the bulb; where several bulbs occupy one pot, place noses pointing to pot rim
- Watering: plant in normal moist rooting medium, water normally after planting, taking care not to over water
- Rooting: rooting may take place in a rooting room 10 - 12°C up to shoot length of max. 10 cm
- Housing time: after planting or after the rooting in a rooting room

Cultivation stage

- Fertilizer: none
- Growth restriction for non-genetically: I
- dwarf cultivars (when permitted): drench or spray experimentally: drench with: "Bonzi" (contains 4 g/l paclobutrazol) or "Reducymol" (contains 250 mg/l ancymidol) dissolved in 100 ml water in the following dosages (per pot and bulb) at 2 - 5 cm shoot length, 1 day before, moisten pots well, with 3 bulbs per pot use double dose with 120 ml water or spray with: 20 ml "Bonzi" (contains 4 g/l paclobutrazol) or 45 ml "Reducymol" (contains 250 mg/l ancymidol) dissolved in 1 liter of water on the dry plant until drops form on both sides at shoot length of 5 - 15 cm; greenhouse temperature for and up to 1 week after treatment min. 15 and max. 22°C, ventilate greenhouse immediately after application, if to be repeated wait at least 1 week
- Growth restriction for non-genetically: II
- dwarf cultivars: raise the night-time temperature in comparison with the day-time temperature
- Greenhouse environment: for rooting 12 - 14°C, then 14 - 16°C (optimal) extending to 20 - 35°C; R.H. 60 - 80%
- Light requirements: up to 600 joules/cm²/day, then shade
- Greenhouse period: 9 - 16 weeks
- Watering: keep normal moisture

Marketing stage

- Storage temperature at producer's: 2 - 5°C, keep as short a period as possible because of lack of light
- Temperature in transit: 2 - 5°C
- Storage temperature at wholesaler's or retailer's: 10 - 16°C, in daylight
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature preferably in a cool but definitely well-lit position
- Watering by customer: moderate
- Keeping quality: good

21. MUSCARI

Plant: *Muscari armeniacum*; *Muscari aucheri* (syn. *Muscari tubergenianum*); *Muscari latifolium*

Family: Liliaceae

Selection for pot production:

Muscari armeniacum

Muscari armeniacum 'Blue Pearl'

Muscari armeniacum 'Blue Spike'

Muscari armeniacum 'Fantasy Creation'

Muscari armeniacum 'Saffier'

Muscari aucheri (syn. *Muscari tubergenianum*)

Muscari aucheri 'Blue Magic'

Muscari latifolium

Colors:

bright blue; single-flowered

bright blue; single-flowered

blue; double-flowered

bluish green; double-flowered

bluish green; single-flowered

bright blue/pale blue; single-flowered

light blue; single-flowered

dark blue/pale blue; single-flowered

Description

- Countries of origin: Southern Europe, North Africa, Western Asia
- Type of bulb/storage organ: true bulb, fleshy and thin-skinned
- Plant habit
 - height: 15 - 25 cm
 - inflorescence: cluster or pyramid-shaped
 - flower shape: single or double bell-shaped florets; 'Fantasy Creation' broccoli-shaped florets
 - leaf color and shape: dark green; narrow
- Dormancy-breaking requirements: by cold period, 9°C and colder
- Winter hardiness: leaf good, flower fair
- Methods of storage: 23°C up to 1 September (for early forcing 20°C), 20°C until 1 October and from October until planting 17°C; good air circulation and ventilation
- Period of availability: August - December
- Saleable sizes (cm)/flower number: *Muscari armeniacum*: 10/+ : 3.5 flower stems per bulb; 9/10: 2.5 flower stems per bulb; 8/90: 1.5 flower stems per bulb, *Muscari aucheri*: 7/+u: 2.5 flower stems per bulb; 6/70: 1.5 flower stems per bulb; 5/60: 1.5 flower stem per bulb, *Muscari aucheri* 'Blue Magic': 9/+u: 5 - 7 flower stems per bulb; 8/90: 4 - 5 flower stems per bulb; 7/80: 3.- 7 flower stems per bulb, *Muscari latifolium*: 7/+ : 1.5 flower stems per bulb; 6/7: 1.3 flower stems per bulb; 5/6: 1.0 flower stem per bulb

Programming for pot production:

- Storage temperature for bulbs cooled to 9°C: Muscari armeniacum: store at 9°C; good air circulation (R.H. 65%) and plant 1 - 2 weeks before housing, Muscari aucheri and Muscari latifolium: plant at once or store for max. 1 - 2 weeks at 9°C + good air circulation
- Start of cold period: depending on type, from about 15 August or later
- Cold period in cold store/rooting room or standing ground: Muscari armeniacum: preferably "dry cooling" for 15 weeks, followed by 1 - 2 weeks "wet cooling" (planted). "Dry cool" only if the R.H. in the rooting room can be kept below 65%, otherwise Penicillium will occur; if "dry cooling" is not possible than plant like the other Muscari's immediately upon receipt, however, results in long leaf!: Muscari aucheri and Muscari latifolium: 13 - 15 weeks "wet cooling", to include if required 1 - 2 weeks "dry cooling"
- Cold temperature: Muscari armeniacum: "dry cooling" 9°C + 1 - 2 weeks "wet cooling" at approx. 11°C for rooting Muscari aucheri and Muscari latifolium: 9°C during "wet cooling", after the cold period ends bulbs will be housed or may be kept at 0 to 1°C
- Planting period: Muscari armeniacum: 1 November – 15 February, 1 - 2 weeks before housing Muscari aucheri and Muscari latifolium: 1 October - 1 December
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH ± 6 - 7; do not press/firm potting compost as this prevents shoot growth
- Planting depth: bulb tip visible
- Watering: up to planting in normal moist potting compost, give pots plenty of water, then little to no watering
- Standing ground: in regions with very low winter temperatures controlled temperature storage is necessary
- Use of standing ground: cover pots on/in standing ground with approx. 5 cm soil over noses
- Frost protection: ensure pots on/in standing ground are in good contact with the soil and cover with a layer of straw (min. 10 cm). During frosty periods also cover with thermal cover + on top extra layer of straw. Remove thermal cover and extra straw layer after frost
- Housing time: after cold treatment

Cultivation stage

- Fertilizer: none
- Greenhouse environment: 14 - 15°C; R.H. 60 - 80%
- Light requirements: > 350 joules/cm²/day
- Greenhouse period: 2 - 1 weeks; Muscari aucheri 3 - 2 weeks
- Watering: sparingly; do not let compost dry out!
- Limit foliage growth: by moderate watering and sufficient light

Marketing stage

- Storage temperature at producer's: 0 - 2°C; if not possible then cool and light
- Temperature in transit: 2 - 5°C; as above
- Storage temperature at wholesaler's or retailer's: 2 - 5°C; as above
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature, and in a well-lit position
- Watering by customer: moderate
- Keeping quality: good to very good ('Fantasy Creation')

22. NARCISSUS TAZETTA

Plant: Narcissus tazetta 'Paper White'

Family: Amaryllidaceae

Selection for pot production:

Narcissus tazetta 'Galilee'

Narcissus tazetta 'Ziva'

Color: white

Description

- Countries of origin: Mediterranean area
- Type of bulb/storage organ: tunicated bulb
- Plant habit
 - height: 35 - 50 cm
 - inflorescence: cluster; fragrant
 - flower shape: cup-shaped
 - leaf color and shape: green; from ground level, linear and ribbon-like
- Dormancy-breaking (for active growth): 17°C
- Winter hardiness: non-hardy
- Methods of storage: constant 25°C + 6 - 4 weeks 17°C, plentiful air circulation and ventilation
- Period of availability: October - February
- Saleable sizes (cm)/flower number : 17/+ : 2.0 flower stems per bulb; 16/17: 1.8 flower stems per bulb; 15/16: 1.5 flower stems per bulb; 14/15: 1.2 flower stems per bulb; 13/14: 1.0 flower stems per bulb

Programming for pot production

- Beginning of cold period (for active growth): mid October to February
- Cold period in cold store/rooting room or standing ground: 6 - 4 weeks
- Cold temperature: 17°C
- Planting period: mid October - February
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH ± 6 - 7
- Planting depth: 1/3 of bulb in the soil
- After potting: to prevent the bulbs pushing themselves out of the pot use in the rooting room for the first 4 weeks foam rubber mats or 1 cm clean gravelly sand up to 1 cm over the bulb nose
- Watering: plant in normal moist rooting medium, water pots after planting
- Housing time: after planting

Cultivation stage

- Fertilizer: none
- Growth restriction for non-genetically short cultivars (when permitted): drench experimentally with 0.2 - 0.3 ml "Ethrel" (contains 480 g/l ethefon) dissolved in 80 ml water per 13 - 15 cm pot at shoot length of 20 cm the day before marketing. Water pots well the previous day, min. 14 - 18°C greenhouse temperature during and after treatment
- Greenhouse environment: 16 - 18°C; R.H. 90%
- Light requirements: up to 350 joules/cm²/day, then shade
- Greenhouse period: 6 - 2 weeks
- Watering: keep normally moist

Marketing stage

- Storage temperature at producer's: 2 - 5°C, R.H. 80 - 90%
- Temperature in transit: 5°C
- Storage temperature at wholesaler's or retailer's: 5°C
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature preferably in a cool position. In cold climate keep indoors
- Watering by customer: very moderate
- Keeping quality: good

23. NARCISSUS

Plant: Narcissus

Family: Amaryllidaceae

Selection for pot production:

Narcissus including long-stemmed:

‘Bridal Crown’

‘Carlton’

‘Dutch Master’

‘Geranium’

‘Golden Harvest’

‘Gold Medal’

‘Ice Follies’

‘Van Sion’

miniature, including:

‘February Gold’

‘Golden Bells’

‘Jetfire’

‘Tête-à-Tête’

‘Topolino’

Colors:

- white/yellow; multi headed, double-flowered
- pale yellow
- pale yellow
- white/orange; multi headed
- golden yellow;
- golden yellow
- white/lemon yellow
- yellow; double-flowered
- yellow
- golden yellow
- yellow/orange
- golden yellow; multi headed
- white/yellow

Description

- Countries of origin: Europe, North Africa, Western Asia
- Type of bulb/storage organ: tunicated bulb
- Plant habit
 - height: 10 - 40 cm
 - inflorescence: single, double and in clusters
 - flower shape: trumpet and cup-shaped, split coronas
 - leaf color and shape: green; from ground level, linear and ribbon-like
- Dormancy-breaking requirements: by cold treatment, 9 - 5 - 2°C
- Winter hardiness: limited
- Methods of storage: miniature narcissi 25 - 20°C, others 20 - 17°C, cooled bulbs 5°C, plentiful air circulation and ventilation

- Period of availability: August - November
- Saleable sizes/flower number: dependent on cultivar, number of flowers is as follows: long-stemmed (riddle sizes in cm) 18/+ : 2 - 3 flower stems per bulb; 14/16: 1 – 2 flower stems per bulb; 12/14: 1 - 1.5. flower stems per bulb; miniature (bulb sizes in cm); 14/+ : 3 flower stems per pot; 12/14: 2 flower stems per pot; 10/12: 1.5 flower stems per pot; miniature (multi headed) 14/+u: 7 flower stems per pot; 12/14: 5 flower stems per pot; 10/12: 4. flower stems per pot, for early flowering use largest riddle or bulb size
- Programming for pot production
- Beginning of cold period: from about 15 September to 15 November
- Cold period in cold store/rooting room or standing ground: 14 week; for more specific information consult your supplier or the Manual, Part I (issued by "The International Flower Bulb Centre").
- Cold temperature: 9 - 5 - 2°C
- Planting period: mid September - February
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH ± 6 - 7
- No. of bulbs per pot: 1 - 3 bulbs per pot, pot size dependent on bulb size
- Planting depth: 1/3 of bulb in the compost
- After potting: to prevent the bulbs pushing themselves out of the pot use in the rooting room for the first 4 weeks foam rubber mats or 1 cm clean gravelly sand up to 1 cm over the bulb nose
- Watering: plant in normal moist potting compost, water pots after planting; do not over water, particularly 'Tête-à-Tête', for fear of Pythium
- Standing ground: in regions with very low winter temperatures controlled temperature storage is necessary
- Use of standing ground: -cover pots on/in standing ground with approx. 10 cm, from February 6 cm, soil over noses
- Frost protection: ensure pots on/in standing ground are in good contact with the soil and cover with a layer of straw (min. 10 cm). During frosty periods also cover with thermal cover + on top extra layer of straw. Remove thermal cover and extra straw layer after frost
- Housing time: after cold treatment

Cultivation stage

- Fertiliser: none
- Growth restriction for non-genetically short cultivars (when permitted): drench experimentally with: 0.2 - 0.3 ml "Ethrel" (contains 480 g/l ethefon) dissolved in 80 ml water per 13 - 15 cm pot at shoot length of 20 cm the day before marketing. Water pots well the previous day, min. 14 - 18°C greenhouse temperature during and after treatment
- Greenhouse environment: 14 - 16°C; R.H. 80 - 90%
- Light requirements: up to 350 joules/cm²/day, then shade
- Greenhouse period: 3 - 1 weeks
- Watering: keep normal moisture

Marketing stage

- Storage temperature at producer's: 0,5 - 2°C + air circulation
- Temperature in transit: 2 - 5°C
- Storage temperature at wholesaler's or retailer's: 2 - 5°C
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature preferably in a cool position
- Watering by customer: very moderate Keeping quality: good

24. ORNITHOGALUM DUBIUM

Plant: Ornithogalum dubium

Family: Liliaceae

Selection for pot production: Ornithogalum dubium

Color: yellow to deep orange

Description

- Countries of origin: South Africa
- Type of bulb/storage organ: round, tunicate bulb
- Plant habit
 - height: 30 - 40 cm
 - inflorescence: pyramidal cluster with 20 or more florets per stem
 - flower shape: saucer-shaped
 - leaf color and shape: dark green; lanceolate and short
- Dormancy-breaking requirements: 7 weeks 28°C
- Winter hardiness: non-hardy
- Methods of storage: 25 - 30°C + 3 - 5 weeks 13°C, good air circulation and ventilation; R.H. 60 - 70%
- Period of availability: December - May
- Saleable sizes (cm)/flower number: 6/+ : 2 - 3 flower stems; 5/6: 2 - 3 flower stems; 4/5: 1 - 2 flower stems; 3/4: 1 - 2 flower stems; 2/3: 1 - 2 flower stems

Programming for pot production

- Storage temperature prior to planting: 13°C + air circulation
- Planting period: 15 December - 15 May
- Rooting medium : well-drained, moisture-retentive rooting medium or standard potting compost, pH 6 - 6.5
- Planting depth: 2 - 3 cm compost over bulb
- Watering: plant in normal moist-retentive rooting medium or potting compost, water normally after planting
- Housing time: after planting

Cultivation stage

- Fertilizer: light fertilization is desirable
- Greenhouse environment: 20 - 27°C; R.H. 60 - 80%
- Light requirements: full sun
- Greenhouse period: 20 - 12 weeks
- Watering: keep moist

Marketing stage

- Storage temperature at producer's : 20°C; if not possible then cool and light
- Temperature in transit: 2 - 20°C; as above
- Storage temperature at wholesaler's or retailer's: 20°C; as above
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature in a well-lit position
- Watering by customer: normal
- Keeping quality: excellent

25. ORNITHOGALUM

Plant: Ornithogalum thyrsoides

Family: Liliaceae

Selection for pot production:

Ornithogalum thyrsoides ('Stam 90')

Ornithogalum thyrsoides 'Eloff'

Color: white

Description

- Countries of origin: South Africa
- Type of bulb/storage organ: round, tunicate bulb
- Plant habit
 - height: 25 - 50 cm
 - inflorescence: pyramidal cluster with 25 or more florets per stem
 - flower shape: cup-shaped
 - leaf color and shape: dark green; lanceolate
- Dormancy-breaking requirements: 7 weeks 28°C
- Winter hardiness: non-hardy
- Methods of storage: 28 - 30°C + 3 weeks before planting 17°C, good air circulation and ventilation ; R.H. 60 - 70%
- Period of availability: January - April
- Saleable sizes (cm)/flower number: 'Stam 90': 3/4 : 2 - 4 flower stems, 'Eloff': 6/+ : 1.5 - 2.0 flower stems; 5/6 : 1.0 - 1.5 flower stems

Programming for pot production

- Storage temperature prior to planting: 17°C
- Planting period: mid January - early May
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH 6 - 7
- Planting depth: 3 - 5 cm compost over bulb
- Watering: plant in normal moist rooting medium: water well after planting
- Housing time: after planting

Cultivation stage

- Fertilizer: light fertilization is desirable
- Greenhouse environment: 10 - 15°C; R.H. 60 - 80%
- Light requirements: up to 600 joules/cm²/day, then shade
- Greenhouse period: 20 - 13 weeks
- Watering: ample, do not water for 4 weeks before harvesting

Marketing stage

- Storage temperature at producer's: 20°C; if not possible then cool and light
- Temperature in transit: 2 - 20°C; as above
- Storage temperature at wholesaler's or retailer's: 20°C; as above
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature in a well-lit position
- Watering by customer: normal
- Keeping quality: excellent

26. OXALIS ADENOPHYLLA

Plant: Oxalis adenophylla

Family: Oxalidaceae

Selection for pot production:

Oxalis adenophylla

Color: pink with white centre

Description

- Countries of origin: Southern Chile, Argentina
- Type of bulb/storage organ: hairy bulb with a large number of (sticky) scales
- Plant habit
 - height: ± 10 cm
 - inflorescence: single-flowered, 2 florets per stem, each floret flowering for 1 day
 - flower shape: shallow, cup-shaped in centre
 - leaf color and shape: silver-green; rosette-shaped
- Dormancy-breaking requirements: by cold treatment, 2°C
- Winter hardiness: slight, needs cover
- Methods of storage: 9°C with plentiful air circulation, can also store August - September 17°C, then 9°C
- Period of availability: August - November
- Saleable sizes (cm)/flower number: 6/+ : 10 - 15 flowers

Programming for pot production

- Beginning of cold period: from 15 September to 15 January
- Cold period in cold store/rooting room or standing ground: 15 - 17 weeks "wet cooling"; if in the greenhouse a temperature of 12°C is given then the first 6 weeks of the cooling period can be a "dry cooling"! With a greenhouse temperature of 18°C max. 3 weeks "dry cooling" only!
- Cold temperature: 2°C
- Planting period: September - January
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH ±6-7
- Planting depth: 2 cm compost over bulb
- Watering: very restricted (after planting in normal moist rooting medium water pots well)
- Standing ground: in regions with very low winter –temperatures controlled temperature storage is necessary
- Use of standing ground: cover pots on/in standing ground with approx. 5 cm soil over noses
- Frost protection: ensure pots on/in standing ground are in good contact with the soil and cover with a layer of straw (min. 10 cm). During frosty periods also cover with thermal cover + on top extra layer of straw. Remove thermal cover and extra straw layer after frost
- Housing time: after cold treatment

Cultivation stage

- Fertilizer: none
- Greenhouse environment: 12 °C is preferred (max. 18°C); R.H. 60 - 80%
- Light requirements: up to 600 joules/cm²/day, then shade
- Greenhouse period: 5 - 3 weeks
- Watering : normal

Marketing stage

- Storage temperature at producer's: 0 - 2°C; if not possible then cool and light
- Temperature in transit: 2 - 5°C; as above
- Storage temperature at wholesaler's or retailer's: 2 - 5°C; as above
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature in a well-lit position
- Watering by customer: moderate
- Keeping quality: good

27. OXALIS TRIANGULARIS

Plant: *Oxalis triangularis*

Family: Oxalidaceae

Selection for pot production:

Oxalis triangularis 'Mijke'

Oxalis triangularis ssp *papilionacea* (syn. *Oxalis regnellii*)

Colors:

purple

white

Description

- Countries of origin: South and Central America
- Type of bulb/storage organ: scaly rhizome
- Plant habit
 - height: 15 - 20 cm
 - inflorescence: single-flowered, several florets per stem, each floret flowering for 1 day
 - flower shape: shallow, cup-shaped in the centre
 - leaf color and shape: mauve, papilionacea: green; clover-shaped
- Dormancy-breaking requirements: none
- Winter hardiness: non-hardy
- Methods of storage: 4 - 5°C, packed in a plastic bag with slightly moistened vermiculite
- Period of availability: starting from December through to September
- Saleable sizes (cm)/flower number: 2/+ : flowers profusely

Programming for pot production

- Growth restriction (when permitted): bulbs may be immersed in 5 ml "Bonzi" (contains 4 g/l paclobutrazol) dissolved in 1 liter of water for 1 minute, should be applied experimentally!
- Planting period: December - September
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost + extra sand, pH 6.5 - 7
- Planting depth: 2 cm compost over rhizome
- Watering: normal (after planting in normal moist rooting medium, water pots lightly)
- Housing time: after planting

Cultivation stage

- Fertilizer: "Osmocote" 14-14-14 from emergence, applied over compost
- Greenhouse environment: 20 - 21°C until first flower, then 18 - 20°C; R.H. 60 - 80%
- Light requirements: up to 600 joules/cm/day, then shade
- Greenhouse period: 10 - 8 weeks; papilionacea 8 - 6 weeks
- Watering: moderate to normal
- Growth restriction (when permitted): immerse rhizome pre-planting or after potting, when shoot emerged, drench a 0.5% solution of "Reducimol" (contains 250 mg/l ancymidol) on the pots; should be applied experimentally!

Marketing stage

- Storage temperature at producer's: 2 - 5°C; if not possible then cool and light
- Temperature in transit: 2 - 5°C; as above
- Storage temperature at wholesaler's or retailer's: 2 - 5°C; as above
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature in a well-lit position
- Watering by customer: moderate
- Keeping quality: excellent

28. OXALIS

Plant: Oxalis deppei

Family: Oxalidaceae

Selection for pot production:

Oxalis deppei

Oxalis deppei 'Iron Cross'

Colors:

deep pink, yellow centre

deep pink, yellow centre, brown cross on leaf

Description

- Countries of origin: Mexico
- Type of bulb/storage organ: true bulb
- Plant habit
 - height: 15 – 20 cm
 - inflorescence: 5 – 12 flowered umbels
 - flower shape: calyx-like
 - leaf color and shape: green with dark red leaf-base or with a brown cross on leaf; clover-shaped
- Dormancy-breaking requirements: heat treatment
- Winter hardiness: non-hardy
- Methods of storage: 4 - 5°C
- Period of availability: old harvest (Lucky clover = leaf plant): October; new harvest: December - May (Autumn flowering moderate)
- Saleable sizes (cm)/flower number : 5/+, 4/5, 3/4; flowers profusely

Programming for pot production

- Storage temperature prior to planting: 2 - 5°C
- Planting period: old harvest: October; new harvest: January - May
- Rooting medium: well-drained, moisture-retentive humus-free rooting medium or standard potting compost, pH 6 - 7
- Planting dept: 1 cm compost over bulb
- Watering: after planting water pots well
- Housing time: after planting

Cultivation stage

- Fertilizer: none
- Greenhouse environment: old harvest: 6 - 8 °C, new harvest: 13 - 20 °, put outdoors approx., 1 May; R.H. 60 - 80%
- Light requirements: up to 1,000 joules/cm²/day
- Greenhouse period: 8 - 7 weeks, March - May 3 - 4 weeks
- Watering: moderate from appearance of leaf
- Growth restriction (when permitted): should be applied experimentally only to well-rooted and well-watered (previous day) pots; old harvest: when plants are 1.5 – 1 cm high, drench with 'Bonzi' (contains 4 g/l paclobutrazol) to the pot; may be applied once or twice during growth; new harvest: when plants are 10 cm high, drench with 'Bonzi'

Marketing stage

- Storage temperature at producer's: 2 – 5 °C (not more than 3 days), if not possible then cool
- Temperature in transit: 2 – 5 °C
- Storage temperature at wholesaler's or retailer's: 2 – 5 °C and light
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature preferably as cool as possible in a well-lit position
- Watering by customer: moderate
- Keeping quality: very good

29. PUSCHKINIA

Plant: Puschkinia scilloides

Family: Liliaceae

Selection for pot production:

Puschkinia scilloides var libanotica

Puschkinia scilloides var libanotica 'Alba'

Colors:

pale china blue

white

Description

- Countries of origin: Caucasus and Asia Minor
- Type of bulb/storage organ: tunicated bulb
- Plant habit
 - height: 15 - 20 cm
 - inflorescence: several stems per bulb, clusters of 8 - 12 florets per stem
 - flower shape: star to bell-shaped
 - leaf color and shape: dark green with blue-green centre vein; parallel-veined
- Dormancy-breaking requirements: by cold period, 9°C and colder
- Winter hardiness: good
- Methods of storage: 20°C, after 1 October 17°C, good air circulation and ventilation
- Period of availability: August - November
- Saleable sizes (cm)/flower number: 5/+ : 1 - 2 flower stems per bulb

Programming for pot production

- Start of cold period: early November - December
- Cold period in cold store/rooting room or standing ground: "wet cooling" (planted) for 15 weeks.
- Cold temperature: 9°C for 4 weeks during rooting, then, depending on sprouting, reducing to 5 - 1°C (the same cold treatment as for tulips)
- Planting period: November - 15 December
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH ± 6 - 7
- Planting depth: ± 2 - 3 cm compost over the bulb
- Watering: after planting in normal moist rooting medium water pots normally
- Standing ground: in regions with very low winter temperatures controlled temperature storage is necessary
- Use of standing ground: cover pots on/in standing ground with approx. 5 cm soil over noses
- Frost protection: ensure pots on/in standing ground are in good contact with the soil and cover with a layer of straw (min. 10 cm). During frosty periods also cover with thermal cover + on top extra layer of straw. Remove thermal cover and extra straw layer after frost
- Housing time: after cold treatment

Cultivation stage

- Fertilizer: none
- Greenhouse environment: 12°C; R.H. 60 - 80%
- Light requirements: up to 350 joules/cm²/day, then shade
- Greenhouse period: 3 - 2 weeks
- Watering: moderate; do not let compost dry out

Marketing stage

- Storage temperature at producer's: 0 - 2°C; if not possible then cool and light
- Temperature in transit: 2 - 5°C; as above
- Storage temperature at wholesaler's or retailer's: 2 - 5°C; as above
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature, and in a well-lit position
- Watering by customer: moderate
- Keeping quality: moderate

30. RHODOHYPOXIS

Plant: *Rhodohypoxis baurii*

Family: Hypoxidaceae

Selection for pot production:

Rhodohypoxis baurii hybride

Color: white, pink and red in various shades

Description

- Countries of origin: South Africa
- Type of bulb/storage organ: corm-like rhizome
- Plant habit
 - height: 5 - 10 cm
 - inflorescence: 1 flower per stem + 1 - 3 lateral stems each with 1 flower
 - flower shape: star-shaped and shallow
 - leaf color and shape: light green; hairy and lanceolate
- Dormancy-breaking requirements: by cold period, 5°C
- Winter hardiness: reasonably
- Methods of storage: 0.5 - 5°C, dry in trays. Preventing desiccation: use sawdust
- Period of availability: February - April
- Saleable sizes/flower number: I: 10 - 12 flower stems

Programming for pot production

- Storage temperature prior to planting: 0.5 - 5°C for a short period
- Planting period: February - April
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH ± 6
- Planting depth: 2 cm over the rhizome
- Watering: plant in normal moist rooting medium, water lightly after planting
- Housing time: after planting

Cultivation stage

- Fertilizer: none
- Greenhouse environment: 10 - 15°C; R.H. 70 - 80%
- Light requirements: up to 350 joules/cm²/day, then shade
- Greenhouse period: 8 - 6 weeks
- Watering: little until leaf appears, then normal

Marketing stage

- Storage temperature at producer's: 5 - 10°C; if not possible, then cool and light
- Temperature in transit: 5 - 10°C; as above
- Storage temperature at wholesaler's or retailer's: 5 - 10°C; as above, e.g. outdoors
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: cool and in a well-lit position, later in Spring in the garden
- Watering by customer: normal
- Keeping quality: excellent

31. SCILLA PERUVIANA

Plant: Scilla peruviana

Family: Liliaceae

Selection for pot production: Scilla peruviana

Color: pale blue

Description

- Countries of origin: Portugal, Spain, Italy, North Africa
- Type of bulb/storage organ: tunicated bulb, more than 1 year old
- Plant habit
 - height: 20 - 30 cm
 - inflorescence: up to 100 florets per stem
 - flower shape: globular
 - leaf color and shape: green, shiny; ribbon-like
- Dormancy-breaking requirements: by cold period, 9°C or colder
- Winter hardiness: moderate
- Methods of storage: 17°C; in well-ventilated trays
- Period of availability: August - October
- Saleable sizes (cm)/flower number: 18/+ : 2 - 3 flower stems per bulb; 16/18: 1 - 2 flower stems per bulb; 14/16: 1 flower stem per bulb

Programming for pot production

- Storage temperature prior to planting: 20 - 17°C; cooled bulbs 9°C and kept as dry as possible
- Start of cold period: 3rd week of September
- Cold period in cold store/rooting room or standing ground: "dry cooling" may be applied for 4 - 5 weeks followed by "wet cooling"
- Cold temperature: 9°C for 6 - 5 weeks, reducing to 5°C, lower than 5°C will retard! R.H. 90 - 95%
- Planting period: September - October
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH ± 6 - 7
- Planting depth: 2 - 3 cm compost over bulb
- Watering: plants in normal moisture-retentive rooting medium or potting compost, after potting water generously
- Housing time: after cold treatment

Cultivation stage

- Fertilizer: none
- Greenhouse environment: 12°C for earliest housing, then reduce to 9°C and for the last housing 3 - 5°C; R.H. 60 - 80%
- Light requirements: up to 1,000 joules/cm²/day
- Greenhouse period: 13 - 17 weeks
- Watering: normal, water well initially

Marketing stage

- Storage temperature at producer's: 2 - 5°C; if not possible then cool
- Temperature in transit: 2 - 5°C; as above
- Storage temperature at wholesaler's or retailer's: 5 - 12°C, in a well-lit position
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature in a well-lit position or outdoors
- Watering by customer: generous
- Keeping quality: very good

32. SCILLA

Plant: *Scilla mischtschenkoana* (syn. *Scilla tubergeniana*); *Scilla siberica*

Family: Liliaceae

Selection for pot production:

Scilla mischtschenkoana (syn. *Scilla tubergeniana*)

Scilla siberica

Scilla siberica 'Alba'

Scilla siberica 'Spring Beauty'

Colors:

pale blue

bright blue

white

deep blue

Description

- Countries of origin: Asia, Europe, Africa
- Type of bulb/storage organ: tunicated bulb, more than 1 year old
- Plant habit
 - height: 10 - 20 cm
 - inflorescence: single to several florets per stem
 - flower shape: star to bell shaped, slightly pendulous
 - leaf color and shape: green; long and lanceolate
- Dormancy-breaking requirements: by cold period, 9°C or colder
- Winter hardiness: good
- Methods of storage: 17°C; in well-ventilated trays
- Period of availability: August - November
- Saleable sizes (cm)/flower number: 8/+ : 2 - 3 flower stems per bulb; 7/8: 1 - 2 flower stems per bulb

Programming for pot production

- Storage temperature for bulbs dry cooled to 9°C: plant immediately! If impossible, then up to maximum 1 week at 9 - 17°C
- Start of cold period: *Scilla mischtschenkoana*: from ± 15 August or later, *Scilla siberica* spp (others): November - December
- Cold period in cold store/rooting room or standing ground: may be given 4 - 6 weeks "dry cooling", followed by "wet cooling"
- Cold temperature: 9°C, reducing to 2 - 1°C (the same cold treatment as for tulips)
- Planting period: September - January
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH ± 6 - 7
- Planting depth: 2 - 3 cm compost over bulb
- Watering: normal
- Standing ground: in regions with very low winter temperatures controlled temperature storage is necessary
- Use of standing ground: cover pots on/in standing ground with ± 2 cm soil over the noses

- Frost protection: ensure pots are in good contact with the soil and cover with a layer of straw (min. 10 cm). During frosty periods also cover with thermal cover + on top extra layer of straw. Remove thermal cover and extra straw layer after frost
- Housing time: after cold treatment

Cultivation stage

- Fertilizer: none
- Greenhouse environment: *Scilla mischtschenkoana*: 15 - 18°C; *Scilla siberica* spp: 10 - 15°C; R.H. 60 - 80%
- Light requirements: up to 350 joules/cm²/day, then shade
- Greenhouse period: 3 - 1 weeks
- Watering: normal, water well initially

Marketing stage

- Storage temperature at producer's: 0 - 2°C; if not possible then cool and light
- Temperature in transit: 2 - 5°C; as above
- Storage temperature at wholesaler's or retailer's: 2 - 5°C; as above
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature in a well-lit position
- Watering by customer: moderate
- Keeping quality: good

33. SPREKELIA

Plant: Sprekelia formosissima

Family: Amaryllidaceae

Selection for pot production: Sprekelia formosissima

Color: bright red

Description

- Countries of origin: Mexico, Guatemala
- Type of bulb/storage organ: tunicated bulb, more than 1 year old
- Plant habit
 - height: 15 - 25 cm
 - inflorescence: 1 flower per stem, 1 - 2 stems per bulb
 - flower shape: orchid-like
 - leaf color and shape: green; narrow and ribbon-like
- Dormancy-breaking requirements: 6 weeks at 20°C
- Winter hardiness: non-hardy
- Methods of storage: 9°C, dry in trays, sawdust may be used, normal air ventilation; R.H. 70%
- Period of availability: February - June
- Saleable sizes (cm)/flower number: 16/+ : 1 - 2 flower stems per bulb; 14/16: 1 flower stem per bulb

Programming for pot production

- Storage temperature prior to planting: 9°C
- Planting period: March - December
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH 6 - 7
- No. of bulbs per pot: 1 - 3 bulbs per pot, pot size dependent on bulb size
- Planting depth: 1/3 of bulb neck above compost
- Watering: immediately after planting water normally, then wait until shoot emerges from bulb
- Housing time: after planting

Cultivation stage

- Fertilizer: none
- Greenhouse environment: 15 - 20°C; R.H. 60 - 80%
- Light requirements: up to 350 joules/cm²/day, from 800 shade
- Greenhouse period: December: 12 weeks, February: 7 weeks, then reducing to 1 week during the summer
- Watering: initially moderate to none, when the stems appear water normally

Marketing stage

- Storage temperature at producer's: 10 – 12°C, light
- Temperature in transit: 5°C
- Storage temperature at wholesaler's or retailer's: 10 - 14°C, plenty of light
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot or tub plant
- Temperature at customer's: room temperature and in sunny position; outdoors as above
- Watering by customer: moderate
- Keeping quality: moderate

34. TULIPA

Plant: Tulipa

Family: Liliaceae

short-stemmed tulips including:

Selection for pot production:

- single-flowered

‘Arma’

‘Couleur Cardinal’

‘Flair’

‘Calgary’

‘Page Polka’

‘Princes Irene’

‘Red Present’

‘Stability’

‘Yellow Present’

- double-flowered

‘Mr. Van der Hoef’

‘Orange Princess’

‘Peach Blossom’

‘Yellow Baby’

Colors:

scarlet

scarlet

red/yellow

white

white/pink

orange-purple

red

purple

yellow

orange

pink

yellow

- dwarf (botanical) tulips including:

Selection for pot production:

‘Pinocchio’

‘Plaisir’

praestans ‘Fusilier’

‘Red Riding Hood’

‘Showwinner’

‘Stresa’

Colors:

scarlet/cream
red/sulphur yellow
orange-scarlet
carmine
cardinal red
red/yellow

Description

- Countries of origin: Western and Central Asia, Caucasus
- Type of bulb/storage organ: tunicated bulb
- Plant habit
 - height: 10 - 40 cm
 - inflorescence: single, double and multi-flowered
 - flower shape: bell, lily, parakeet and trumpet-shaped
 - leaf color and shape: green and green and cream; linear, elliptical or lanceolate
- Dormancy-breaking requirements: by cold period, 9 - 5 - 2°C
- Winter hardiness: poor
- Methods of storage: 20°C up to 15 October, then 17°C; dry cooled bulbs 9°C; good air circulation and ventilation; R.H. 70 - 80%
- Period of availability: August - December
- Saleable sizes (cm)/flower number: 12/+ : 1 flower stem per bulb; 10/11: as above for early flowering, use largest size of bulb

Programming for pot production

- Start of cold period: from about 15 August - 15 December
- Cold period in cold store/rooting room or standing ground: 14 weeks (preceded by 1 week extra intermediate temperature (20°C) for the earliest one's)
- Cold temperature: 9 - 5 - 2 - 0°C.
- Number of cold weeks: 14 weeks
- Planting period: mid October to mid December
- Rooting medium: well-drained, moisture-retentive rooting medium or standard potting compost, pH ± 6 - 7
- Planting depth: -1/3 of the bulb under the compost, flat side outwards
- After potting: to prevent the bulbs pushing themselves out of the pot use in the rooting room for the first 4 weeks racks, foam rubber mats or clean coarse sand up to 3 cm over the bulb nose.
- Watering: plant in normal moist rooting medium or potting compost
- Standing ground: in regions with very low winter temperatures controlled temperature storage is necessary
- Use of standing ground: cover pots on/in standing ground with about 10 cm and from February 6 cm soil over the noses
- Frost protection: ensure pots on/in standing ground are in good contact with the soil and cover with a layer of straw (min. 10 cm). During frosty periods also cover with thermal cover + on top extra layer of straw. Remove thermal cover and extra straw layer after frost
- Housing time: after cold treatment

Cultivation stage

- Fertilizer: none
- Growth restriction for non-genetically dwarf cultivars (when permitted): long-stemmed tulips (see page 90); experimentally, "Bonzi" (contains 4 g/l paclobutrazol) or "Reducymol" (contains 250 mg/l ancymidol) may be applied in the following dosages apply at shoot length of 2 - 8 cm, 1 day before, moisten pots well, greenhouse temperature up to 1 week during and after application min. 17°C
- Greenhouse environment: 16 - 20°C; R.H. max. 75%
- Light requirements: up to 350 joules/cm²/day, then shade
- Greenhouse period: 4 - 2 weeks
- Watering: keep normally moist

Marketing stage

- Storage temperature at producer's: 1 - 2°C + air circulation
- Temperature in transit: 1 - 2°C
- Storage temperature at wholesaler's or retailer's: 1 - 5°C
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: room temperature preferably in a cool position
- Watering by customer: normal
- Keeping quality: good

35. ZANTEDESCHIA AETHIOPICA

Plant: Zantedeschia aethiopica (syn. Calla aethiopica)

Family: Araceae

Selection for pot production:	Color:
Zantedeschia aethiopica 'Innocence'	white; large-flowered
Zantedeschia aethiopica 'Childsiana'	white; large-flowered
Zantedeschia aethiopica 'Crowborough'	white; large-flowered
Zantedeschia aethiopica 'Green Goddess'	green/white; large-flowered

Description

- Countries of origin: South Africa, Mediterranean countries
- Type of bulb/storage organ: rhizome
- Plant habit
 - height: 35 - 100 cm
 - inflorescence: spadix
 - flower shape: conical sheath containing flower spadix
 - leaf color and shape: dull to shiny green; large and round or heart-shaped
- Dormancy-breaking requirements: none
- Winter hardiness: non-hardy; 'Crowborough' slightly so
- Methods of storage: 4 - 13°C, normal air circulation and some ventilation; R.H. 75 - 80%
- Period of availability: August - March
- Saleable sizes (cm)/flower number : 16/20: 3 - 6 flowers per rhizome; 14/16: 2 - 4 flowers per rhizome; 12/14: 1 - 3 flowers per rhizome

Programming for pot production

- Storage temperature awaiting planting: max. 8°C, + good air circulation; R.H. 70 - 75%
- Planting period: August - December
- Rooting medium: a light, well-drained, moisture-retentive rooting medium or standard potting compost, pH 5.5 - 7; possibly mixed with 10 - 20% Perlite and coconut fibre
- Fertiliser: 600 gm. "Osmocote" 12.5-15-27 per m³
- No. of rhizomes per pot: 1 large or 2 - 3 small rhizomes
- Planting depth: upright placement with 1 cm compost over top of rhizome
- Watering: after planting in normal moist rooting medium, water pots generously
- Housing time: after planting

Cultivation stage

- Chemical growth regulation (when permitted): 2 - 4 ml "Bonzi" (contains 4 g/l paclobutrazol) in 150 ml water per pot just before flowering when plant has reached 2/3 of final size
- Greenhouse environment: 8 - 12° C, up to 18°C during flowering; R.H. 60 - 80%
- Light requirements: 600 joules/cm²/day, then shade
- Greenhouse period: 16 - 20 weeks
- Watering: give small amounts frequently to keep well moistened, keep plant foliage dry, water in the morning
- Diseases: very susceptible to bacterial disease Erwinia: avoid high temperatures and R.H., remove affected plants at once

Marketing stage

- Storage temperature at producer's: 5 - 17°C; R.H. 60 - 70%, flower is easily damaged
- Temperature in transit: 5 - 20°C; as above
- Storage temperature at wholesaler's or retailer's: 5 - 17°C; as above
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot or tub plant
- Temperature at customer's: 5 - 20°C; as above
- Watering by customer: water regularly and well
- Keeping quality: excellent

36. ZANTEDESCHIA

Plant:

Zantedeschia albomaculata
Zantedeschia elliottiana
Zantedeschia rehmannii
Zantedeschia hybrids (syn. Calla)

Family: Araceae

Selection for pot production:

Zantedeschia albomaculata
Zantedeschia elliottiana
Zantedeschia elliottiana 'Solfatare'
Zantedeschia rehmannii
Zantedeschia hybrids including:
'Black Eyed Beauty'
'Black Magic'
'Cameo'
'Mango'
'Treasure'

Colors:

white; large-flowered
yellow; large-flowered
cream; large-flowered
pink; mini-flowered
cream, black centre; small-flowered
lemon yellow; small-flowered
pink/salmon; small-flowered
orange/red; small-flowered
orange/yellow; small-flowered

Description

- Countries of origin: South Africa
- Type of bulb/storage organ: irregularly shaped tuber
- Plant habit
 - height: 25 - 70 cm
 - inflorescence: flower spadix
 - flower shape: Colored trumpet-shaped bract surrounds flower spadix
 - leaf color and shape: all green or faintly to heavily spotted; spear-shaped, round or heart-shaped
- Dormancy-breaking requirements: by warm period, keep dry
- Winter hardiness: non-hardy
- Methods of storage: 2 weeks at 20°C, then 12 - 13°C, spadix develops max. 8°C, very good air circulation and ventilation; R.H. 60%; when spadix develops max. 8°C
- Period of availability: December - August
- Saleable sizes (cm)/flower number: 16/20: 3 - 6 flower stems per tuber; 14/16: 2 - 4 flower stems per tuber; 12/14: 1 - 3 flower stems per tuber

Programming for pot production

- Storage temperature prior to planting: max. 8°C; + good air circulation; R.H. 70 - 75%
- Flower promotion: immerse tubers for 15 minutes in
- Planting period: December - August
- Rooting medium: light, well-drained, moisture-retentive rooting medium, pH ± 5.5 - 7; may be mixed with 10 - 20% sand
- Fertilizer: 0.6 kg "Osmocote" 12.5-15-27 per m³
- No. of tubers per pot: 1 tuber per pot, pot size dependent on tuber size
- Planting depth: 4 - 5 cm soil over tuber (plant 2/3 way up the pot)
- Watering: after planting in normal moist rooting medium water generously, thereafter when roots are developed moderately to very moderately
- Housing time: after planting

Cultivation stage

- Growth restriction (when permitted): mix 1 - 4 ml "Bonzi" (contains 4 g/l paclo butrazol) with 100 ml water per pot and apply when shoot is 2 - 4 cm high
- Greenhouse environment : day temperature 16°C, depending on light may be 20°C max. 25°C; R.H. 60 - 80%
- Light requirements: up to 1,000 joules/cm²/day, then shade
- Greenhouse period: 12 - 9 weeks
- Watering: keep the rooting medium dry to moist; but keep the plant dry, water early in the morning! Check the roots! When roots are "glassy", too much water has been given
- Diseases: very susceptible to bacterial disease Erwinia; avoid high temperatures and R.H. and pots that are too wet or too dry; remove affected plants at once

Marketing stage

- Storage temperature at producer's: 10°C; in a well-lit position to prevent elongation
- Temperature in transit: 10 - 14°C; as above
- Storage temperature at wholesaler's or retailer's: 10 - 14°C; as above
- Suitable domestic location: living room, patio/balcony, garden
- Use as: pot plant
- Temperature at customer's: 10 - 22°C; as above
- Watering by customer: moderate
- Keeping quality: excellent