CUCURBITS

This group of crops includes pumpkins, squashes, vegetable marrows, cucumbers, musk and sweet melons, and watermelons, as well as loofah, calabash and various gourds.

CLIMATE REQUIREMENTS

The minimum soil temperature for good germination is approximately 18°C, and the maximum 30°C to 35°C. Seed germinates relatively poorly at temperatures below 15°C and such temperatures also retard root growth.

All cucurbits are sensitive to frost. Almost no growth takes place at temperatures below 15°C, but is rapid between 18°C and 30°C. Plants grow more luxuriantly at higher temperatures. However, relatively low temperatures and short daylight periods promote the formation of more female, in relation to male, flowers; while at high temperatures (35°C or more) only male flowers may be formed. There is poor pollination of female flowers when temperatures drop below 10°C for pumpkins and squashes, 15°C for watermelons and cucumbers and 20°C for muskmelons (also called spanspek or cantaloupe); higher temperatures tend to promote pollination.

High atmospheric humidity, especially in the later growing stages, and particularly for muskmelons and watermelons, favour the development of fungal diseases and these two fruits are seldom grown in KZN on a commercial scale. Prolonged cool, cloudy or moist weather over the flowering season will often reduce bee activity, and result in poor pollination of flowers and a reduced fruit-set.

SOILS

Sandy loam to loam soils, with a clay content of 15% to 30% clay, which are well-drained to a depth of 900 mm, or more, are ideal. The minimum soil depth is 450 mm. The surface of heavier soil types tends to remain damp too long, and may promote fruit rots.

TYPES, CULTIVARS AND GROWING SEASONS

Trailing type	Cultivars	Time to first harvest and harvesting period
Pumpkins	Flat White Boer(Ford), Flat White Boer (van Niekerk) Crown Prince, Bush Prince, Bounty, Jamboree, Star 7001	110 to 130 days
Hubbards	Green, Green Chicago Warted,Golden	100 - 120 days
Butternut squash	Waltham	90 - 100 days

All the above types may be picked over 1 month or more, and be stored for 1 to 3 months after maturity. Sunburn may be a problem with dark-coloured fruits, such as Queensland Blue and the green Hubbards.

Gem Squash - Rolet 80 - 95 days
Harvest over 1 to 2 months

Table Queen squash -	85 - 95 days Harvest over 1 to 2 months

Bush type

Corsair, Gemma, Raven, President	30 - 50 days as baby marrows
Jaguar, Eight Ball, Sunny Delight,Green Patty, Sunburst	10 - 20 days longer to full size Harvest over 1 to 3 months

PLANT SPACING AND SEEDING RATES/HA

Pumpkins and Hubbards	500 mm x 2,0 to 2,7 m	4 to 6 kg
Butternuts, Gems and Table Queen	300 to 500 mm x 1,2 to 1,8 m	2 to 3 kg
Cucumbers	300 mm x 1,2 to 1,5 m	2 to 3 kg
Melons	300 mm x 1,5 to 2,0 m	3 to 4 kg
Watermelons	500 mm x 1,8 to 2,5 m	3 to 4 kg
Bush types	300 to 500 mm x 1,2 to 1,5 m	4 to 6 kg

TIME OF PLANTING

Cucurbits do not normally transplant easily, so are usually direct-seeded in the land. Often 2 to 4 seeds are planted on each site and excess plants later thinned out. Occasionally, use is made of young speedlings, especially for squashes and marrows, where early crops are wanted in cooler areas; seeding rate for this purpose varies from 1 to 3 kg per ha.

Planting in cooler areas should be delayed until after the last frosts, and when the soil has warmed up to at least 18°C. The crop should be harvested before the first frosts of winter.

Climate		**Ideal times**
Cool	(moderate frost)	September - December/January
Warm	(light frost)	August - January/February
Hot	(frost free)	March - May, July/October

FERTILIZER REQUIREMENTS

Soils with a pH (KCl) lower than 5,0 should be limed.

The fertiliser requirements of these crops are not particularly high. The nitrogen requirement is about 70 kg to 100 kg per hectare. Phosphorus (with a minimum of 40 kg) and potassium dressings are adjusted according to soil analysis figures. Generally, 50 kg of phosphorus and 100 kg of potassium are used. Half to two-thirds of the nitrogen, and all the phosphorus and potassium, are applied at planting, with the remaining nitrogen being applied 3 to 4 weeks after emergence. The fertilizers 2:3:4 (30) at about 600 kg / ha, and 200 kg LAN as a side dressing, are commonly used.

Where molybdenum is known to be deficient, the required seed per hectare is soaked, for 4 to 6 hours, in a solution of 15 g to 20 g sodium or ammonium molybdate in 5,0 l water. The soaking also encourages rapid germination. Plants may also be sprayed, in early growth, with 125 g of one of these chemicals in 500 l water per hectare, where deficiency symptoms are observed.

Nitrogen defiency results in the reduction of vegetable growth, and a chlorosis of leaves, initially the older leaves. Defiency symptoms of molybdenum are similar, that is older leaves becoming pale green with interveinal mottling, because such deficiencies interfere with plant nitrogen metabolism. It is most likely to occur in very acid soils. In general, element deficiencies result in slowed growth rates and possibly stunted appearance of plants.

IRRIGATION

The soil should be kept fairly moist until the crop has emerged. To encourage deep rooting the soil should, during the first third of the growing period, be wet to a depth of 450 mm, whenever 90% of the available soil moisture has been depleted. Thereafter, allow only 50% depletion before wetting the soil to a depth of 600 mm. Adequate watering from flowering onward is most important.

WEED CONTROL

Mechanical weed control is practised only in the early stages of growth. Hand weeding is most commonly used.

The herbicides which are registered for use do not control broad-leaved weeds. Cycloxydim (Focus Ultra) is for both annual and perennial grass control, while propaquizafop (Agil 100) is used against certain annual grasses at a young growth stage. Haloxyfop-R methylester (Gallant Super and Verdict Super) may be used to control certain annual and perennial grass species.

PESTS

Nematodes and pumpkin flies are the major pests. American bollworm, which attacks the flowers and very young fruit , red spider mites on the underside of leaves and aphids, which suck tender growth, may sometimes be troublesome. Ladybirds and thrips are relatively minor pests. When implementing a spray programme, ensure that bees are not harmed, as they are essential for pollination. For pumpkin fly control, spray with fenthion (Grab, Lebaycid or Sanfen) on the plants, especially the fruit, or use a bait of mercaptothion or trichlorfon with sugar, as a coarse droplet spray. Endosulfan controls bollworm in commercial plantings, and a number of aphicides are registered.

DISEASES

Powdery mildew in warm, dry weather; downy mildew under moister conditions (especially on cucumbers and sweet melons), and various virus diseases are the major diseases. A number of fungicides are registered for control of either powdery or downy mildew, as well as certain other diseases. Mosaic diseases are transmitted by sucking insects and will cause significant losses (yield and cosmetic) in late-planted crops. Fungal and bacterial fruit rots, especially in stored fruits, including anthracnose in wet weather, may be troublesome. Several of the prophylactic fungicides used as a precaution against downy mildew will also protect against anthracnose.

YIELDS (t/ha)

	Conservative	Likely	Good
Pumpkins and Hubbards	12 to 15	18 to 20	30
Butternut and Gems	12	15 to 18	25 to 30
Cucumbers	12	15 to 18	25 to 30
Sweet melons	12	15 to 18	25
Watermelons	12 to 15	20	30
Marrows, bush, large	12	15 to 18	25 to 30
Marrows, baby	7 to 8	12	15 to 20

HARVESTING, GRADING, PACKING, STORAGE AND MARKETING

Most of these fruits should be cut from the plants, and not simply pulled off. A short section of stem is usually retained on the fruit to reduce the incidence of fruit rots at the stem end. Pumpkins, Hubbards and butternuts are harvested when fully sized, and when the skins have hardened. If well-ripened they may be stored for several months. Hubbards do not store as well as the others, and are usually sold fresh. When very scarce, they may be marketed before the skins harden, but their keeping quality is greatly reduced by doing so.

Gems and Table Queens are picked when fully sized, but preferably before the skins harden. Mature vegetable marrows are harvested at a similar stage. Baby marrows are picked when very immature, often before the blossom is shed, usually at a diameter of 20 mm to 30 mm, and a length of 100 to 200 mm.

Cucumbers are harvested before attaining their full size. For pickling, they are gathered at a very young stage.

Sweet melons are harvested before they are fully mature, but sufficiently mature to ripen fully after being picked. Experience with the specific cultivar is needed to determine the harvest stage, as is also the case with watermelons, which, however, do not ripen up after being harvested. Watermelons should be ripe, but not over-ripe. Ripe fruits usually emit a dull sound when tapped with the finger; the small leaf and tendril on the vine, near the fruit attachment, are both normally dry, and the dark green base colour of the fruits turns a lighter green to yellowish colour.

The fruits should be handled carefully at all times. This is particularly important for tender, young fruits of baby marrows, which are easily bruised or scratched.

Most types are graded according to uniformity of maturity, size, shape and colour, before being packed. Badly damaged or diseased fruits are discarded.

Pumpkins and Hubbards are usually marketed in mesh pockets holding about 30 kg of fruit. The colour of the pocket varies with the colour of the product, and is important in its presentation on the market floor.

Gems, Table Queens, butternuts and cucumbers are sold in similar, but smaller pockets,

holding about 10 kg to 15 kg of fruit.

Baby marrows are usually packed in cartons holding 3 kg to 6 kg, or are pre-packed in smaller containers.

Sweet and musk melons are packed in wooden or cardboard containers varying in size from about 200 mm to 400 mm x 400 mm to 600 mm, and about 140 mm to 165 mm deep.

Watermelons are usually sold loose.

PRICE TRENDS

The seasonal price trends for all these warm-season crops will be similar, with adjustments being made for the differing lengths of season required by them to reach market maturity. Prices are generally highest in spring.

Table 21.
Total tonnages for Butternut sold on the Durban National Market per year from 1993 to 1997, and mean annual prices (R per ton obtained).

	1993	1994	1995	1996	1997
Tons sold p.a.	4.677	4.904	4.533	4.44	5.058
Ave. R/ton	625	584	690	827	666

Table 22.
Total tonnages for Gem Squash sold on the Durban National Market per year from 1993 to 1997, and mean annual prices (R per ton obtained).

	1993	1994	1995	1996	1997
Tons sold p.a.	2.245	1.539	1.548	1.34	1.243
Ave. R/ton	408	792	572	645	618