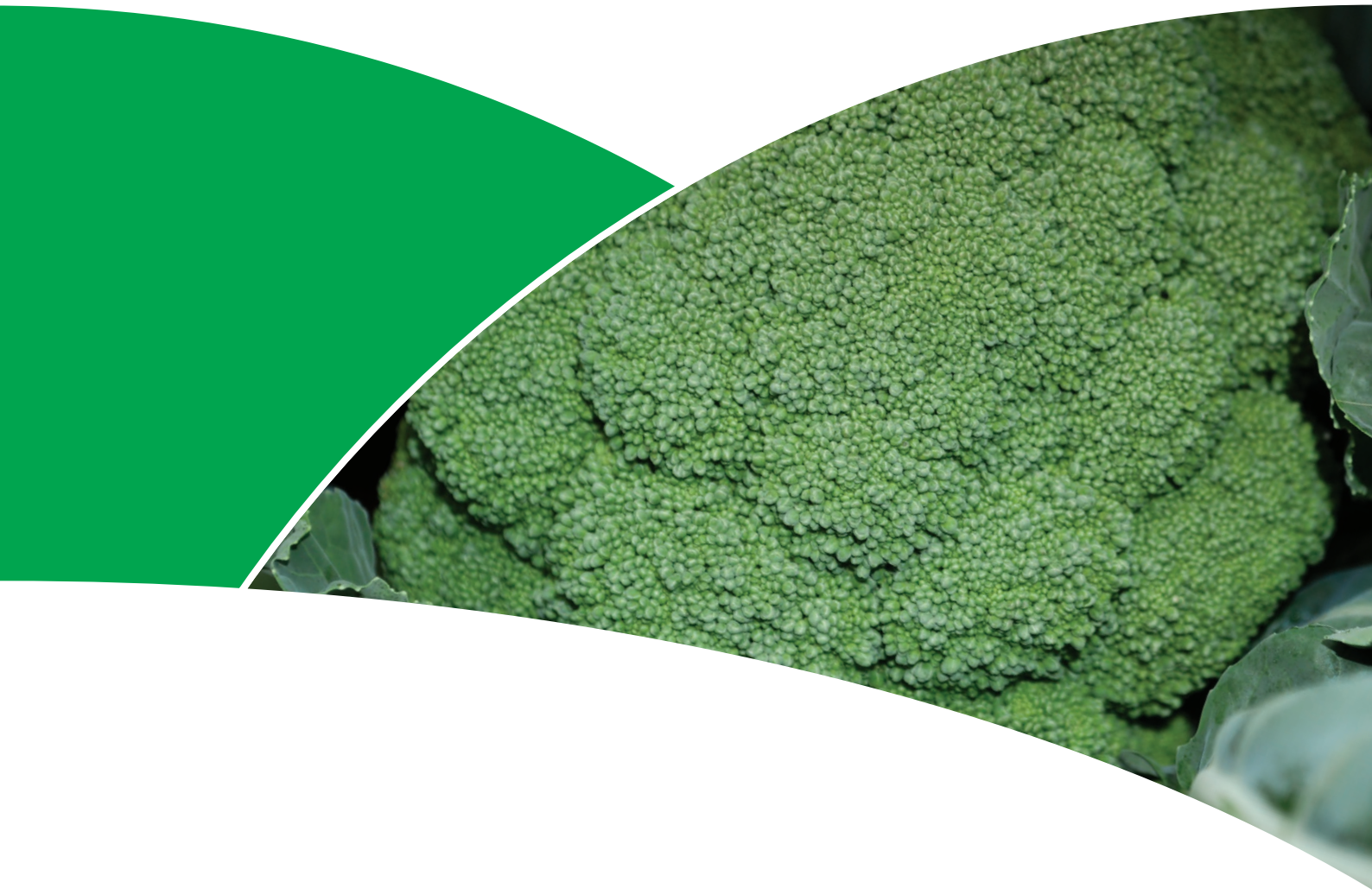
STARKE AYRES®



BROCCOLI

PRODUCTION GUIDELINE

BROCCOLI

1.1 HISTORY AND BACKGROUND

Brassica oleracea var. italica commonly known as broccoli has its origins in Italy and this vegetable is considered to be one of the most nutritious vegetables in the world. Broccoli has amongst the highest concentration of magnesium, iron and calcium amongst all vegetables. Broccoli also has very high quantities of vitamin A and vitamin C.

2. ADAPTABILITY

2.1 CLIMATIC REQUIREMENTS

- Optimum soil germination temperature 22 °C.
- Optimum growing temperature 15.5 - 17 °C.

2.2 SOIL REQUIREMENTS

Well drained loamy soils with an effective rooting depth of approximately 450 - 600mm is recommended and pH 6-6.8.

2.3 PRODUCT TYPES

The most common type of Broccoli is the "calabrese" type green headed broccoli which forms a multi floretted head with a diameter of between 10cm and 20cm with thick stalks. The other less common types of broccoli are the sprouting type broccoli with thin stalks and many heads at the end of the stem and tender-stem broccoli which has its origins in Japan and has one floret/head at the end of each long thin stem. Starke Ayres has a range of cultivars suited for different seasonal slots.

3. CULTIVATION PRACTICES

3.1 SOIL PREPARATION

The soil should be prepared thoroughly and deeply before planting. The soil (if necessary) should first be ripped and then ploughed and disced.

3.2 PLANTING PERIODS

Depending on the variety and region, broccoli can be grown throughout the year. On the Highveld the crop should not be sown between May and July because of the low temperature. Broccoli is generally transplanted as seedlings. Healthy one month old seedlings are recommended for transplanting purposes.

3.3 SEEDLING PRODUCTION

Seedlings should be grown in a well-aerated medium, which has good water holding capacity and at a pH of around 6.5. Generally, peat, bark and vermiculite mixes are used. Medium problems typically include excessive tannins and low air filled porosity, which results in poor drainage and the buildup of green mould. The medium should be pre-enriched and the seedlings should be fertilized. For optimum germination, the seedling trays should be placed in a germination chamber, at 20 °C with high relative humidity. The seedlings should be moved to the tunnel at the first sign of germination. The ideal temperature for seedling cultivation is 20 °C.

Seedling management is a critical factor in broccoli production, as the following factors related to seedling production may result in physiological disorders:

- Incorrect sowing time.
- Cold temperatures, particularly below 7 °C.
- Cold grown seedlings.
- Over-fertilization of seedlings.
- Oversized seedlings at transplant.
- Temperature differences between the seedling nursery and the farm.

A precision planter is recommended to place single seedlings at a uniform depth.

3.4 PLANT POPULATION AND SPACING

A general spacing of between 20 000 and 40 000 plants per hectare is recommended.

3.4.1 TRANSPLANTING SEEDLINGS

The following points should be kept in mind when transplanting broccoli seedlings.

Firstly the seedlings must be transplanted and watered as soon as possible after they have been obtained from the nursery. Ideally seedling should be transplanted 5 weeks after sowing. Secondly the seedlings should be placed vertically into the ground and not sideways. This is to avoid a condition known as "J rooting". This condition results in a J shaped root system that ultimately decreases yield and head size. Thirdly the grower should ensure that seedlings are planted at the correct depth in a planting hole that has been formed into the ground prior to planting. If the seedlings are forced into the ground, without a hole being prepared for them to be inserted into, the root system may be damaged and the plant will experience stress resulting in poor yield. Once the seedling is placed in the hole the area should be firmed so that sufficient contact is made between the seedling and the soil.

When planting seedlings a choice can be made between the square method and the staggered method of planting. The staggered method is more advantageous as there is less competition between plants compared to the square method where plants are directly opposite each other, thus maximizing competition. See the following Figures 1 and 2.

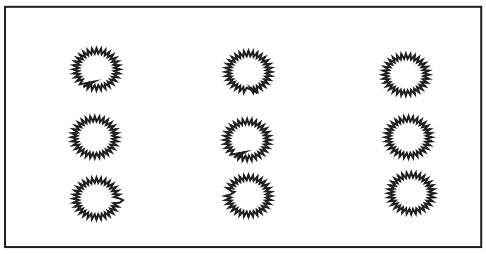


Figure 1: Square planting method.

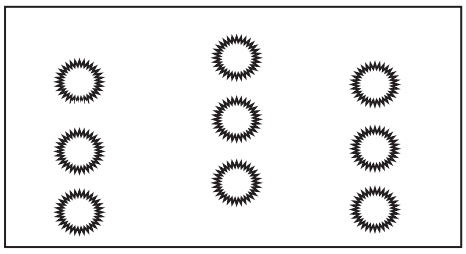


Figure 2: Staggered planting method.

3.5 FERTILIZATION

The soil is a resource that needs to be managed and monitored meticulously. It is essential that a grower have soil samples of the intended growing area analysed by an accredited laboratory to determine the nutrient status of the soil. Based on soil analysis results a fertilization programme can then be developed. This programme is obviously specific for the type of soil that was sampled and subsequently analysed. This exercise should be done every season or every time a new crop is planted on the land.

In addition to having soil samples tested, the water quality should be analysed because water quality can have a direct effect on the growth of the plant. For example, irrigation water with high calcium levels can increase the soil pH.

3.5.1 FERTILIZATION GUIDELINE

N: 200-240 kg/ha. 60-80kg/ha worked into soil before planting. (2:3:2 or 2:3:4).
P: 50 - 60kg/ha worked into soil before planting.
K: 250kg/ha worked into soil before planting.

The balance of the fertilizer you top dress as follow,
Summer: 7 days after transplant 5g per plant. And repeat on days 14 and 28.
Winter: 14 days after transplant 5g per plant. And repeat on days 28 and 45.

* This is only a guide, soil analysis is essential

Micro-elements:

- **Low Micro-element Sensitivity to:** Manganese (Mn), Zinc (Zn), Copper (Cu)
- **High Micro-element Sensitivity to:** Boron (B), Molybdenum (Mo), Iron (Fe)

3.6 IRRIGATION

Total water requirement is approximately 440 mm.
As a general guideline apply 10 to 15 mm per week for the first third to half of the growing season, and about 25 mm per week thereafter for winter production. Corresponding figures during summer would be 20 to 25 mm and 40 to 50 mm, respectively. Do not let the soil dry out.

4. HARVESTING AND MARKETING

Use a sharp knife to cut mature heads. Cut the head stem a few centimetres below the head. Heads can be pre-packed or sold loose for the fresh market. Store in a cool dry place (preferably refrigerated), to reduce the effects of field heat after harvesting.

The ideal is to have a high first cut percentage, (80% +). This can be achieved through good management and choosing a cultivar that produces uniform heads. If the cultivar does not mature uniformly, further costs such as irrigation and labour are incurred for each subsequent cut.