



## Crop Guide – Stevia

PLEASE REMEMBER TO ALWAYS READ THE LABEL BEFORE USING ANY CHEMICAL

### About Stevia

Stevia locally called Sweet Leaf or Sugar leaf, is increasingly becoming an important crop in Africa. It is grown for its sweet leaves and medical properties. With the rise in demand for low-carbohydrate, low-sugar food alternatives, the demand for stevia has been on the rise. It can be used instead of the chemical sweeteners and even table sugar. The sweetness in the leaf is due to the presence of an intensive-sweetening agent called stevioside. The leaf by itself is about 20- 30 times sweeter than sugar with zero calories, whereas pure extract is 300 times sweeter than sugar. The leaf has stevioside of 10-12% on dry weight basis.

### Utilization

1. Stevia leaves are used as sweeteners, due to the presence of sweet crystalline glycosides called steviosides which are 200-300 times sweeter than sucrose. Stevioside is non-caloric, non-fermentable, non-discolouring, heat stable at 95°C and has a lengthy shelf life.
2. The sweetener can be added to cooked/baked goods or processed foods and beverages.
3. It is added to products such as chewing gum, toothpaste, mouthwash and even an antismoking lozenge.
4. Stevia, when used in place of sugar, may also reduce the incidence of tooth decay.
5. Stevia is calorie free, and therefore the dose not impact blood sugar levels, unlike sucrose (refined sugar). The leaves can be used raw or cooked.
6. The leaves can also be cooked and eaten as a vegetable.

### Potential for production

- There is growing international market for Stevia thus creating more opportunities as people learn about the ill effects of artificial sweeteners the increasing preference to natural alternatives.
- In Africa, there is low consumption of stevia; most of it is grown for export markets which include: China, Paraguay and Malaysia. The market potential for this natural sweetener is still untapped.

### Ecological Requirements

#### Altitude:

Stevia grows at altitude of 1,200m and above. However it can be grown at any altitude provided the temperatures are within the required limits. The best production areas are in highlands areas

#### Rainfall:

It requires a well distributed annual rainfall of about 900 –1400 mm. The plant does not tolerate water logging.

**Temperature:**

Stevia can be grown in areas with temperature between 10°-37°C; however it performs best at temperature range of 15°C to 30°C.

**Light:**

The plant requires full sun but not hot weather.

**Soil:**

Stevia grows well on a sandy loam soil. It can also do well on a wide range of soil types as long as they are well drained. It does not perform well on clay or poorly drained soils. The soils pH should range between pH of 5.5 to 6.5. Stevia does not grow well in saline soils.

**Varieties:**

In Africa there are several varieties that have been developed to adapt to the local ecological conditions but mostly the two varieties are grown:

- a) Londiani 1
- b) Pure cycle1

Stevia leaves determine the price and marketability of Stevia leaves. The stevioside content in these varieties is about 9% which is the minimum market requirement.

**Production Considerations:**

- Production should have required climatic conditions.
- Get planting material from a reliable source.

**Propagation:**

- Stevia plants can be propagated from cuttings as well as through seeds. In many of the cultivars, seed germination rate is poor, and crop raised through seedlings take more time to establish.
- It is best to propagate stevia plants from cuttings or tissue culture. Growing stevia from seed normally result in very low germination rate.
- Rooting can be enhanced by using commercial rooting hormones. Cutting should be 2-4 inches long, from leaf axils of current year growth with at least two leaf buds above ground.
- Sweetness in leaves varies with varieties. Therefore, for propagation cutting should be obtained from a source, which is high in stevioside and low in associated bitterness.

**Raising seedlings:**

Use of raised beds is recommended for raising transplants. The raised bed should be 15 cm in high and 1m wide. The recommended distance between each plant is 2.5 cm and 5 cm between the rows. Watering should be done only if the soil moisture is low to avoid overwatering that may cause damping off disease.

Disbudding - when the cuttings have rooted and established the tips are cut to increase lateral growth.

Hardening off - after disbudding the plants remain covered for about 3-4 days after which the plants the shade is removed to acclimatize the plant the field environment. Hardening off takes approximately one week.

### **Field establishment:**

#### I. Land preparation

Land should be ploughed twice to break down the clods and harrowed to a fine tilth. The manure has to be applied as a basal dressing during the last ploughing to incorporate the manure with soil. Raised beds are best for production.

#### II. Transplanting

The seedlings are removed from the bed and put on a wet place or in a container with soggy soil to ensure that there is minimal disturbance during the process.

#### III. Spacing

Spacing varies depending on type of soil and climate conditions. Generally it is advisable to plant a minimum of 75,000 plants per hectare. Spacing of 20cm between the plants and 20- 35cm between the rows may be used.

### **Fertilizer:**

The nutrient requirements for Stevia are low to moderate. The plants respond well to fertilizers with lower nitrogen. Manure is applied at a rate of 20kg/m<sup>2</sup> at the time of field preparation. In cases of low soil fertility, NPK fertilizer can be applied as the basal dressing and CAN fertilizer used for topdressing depending on soil requirement.

### **Irrigation:**

Normally, stevia plants require frequent, shallow irrigation. Generally, irrigation is required when the stem tips begin drooping. Avoid over watering after transplanting. Weeding Stevia is a poor competitor to weeds during its initial growth period; there are no effective herbicides for stevia, and weeding has to be done manually.

### **Mulching:**

Apply a layer of mulch to keep roots cool, preserve water, keep the leaves clean from soil and suppress weeds.

### **Pests and Diseases:**

Field-grown stevia is not known to have serious insect pest problems and is often reported as exhibiting insect-repellent qualities. There are no known diseases and pests of economic importance in Kenya.

### **Harvesting:**

- The first harvesting can be done 2-3 months after planting. Subsequent harvesting can be done every 3 months, for 3 consecutive years. The sweetener in the leaf is at maximum till the plant flowers.

- The optimum yield (biomass), and stevioside quality and quantity are best just prior to flowering. Plants should not be allowed to flower since after flowering the Stevioside percentage goes down rapidly and leaves are rendered unmarketable. Flowers impart a bitter flavour to the leaves.
- Leaves are harvested by cutting the entire plant with the side branches leaving 10 - 15 cm from the base just before flowering. Harvest only in the morning for the highest glycoside/ sugar content.
- Within four days after harvesting, CAN or NPK fertilizers or organic manure can be added. The new flush of leaves sprouts after cutting and the new plant is ready for harvest again in 3 months.
- Maximum amount of leaves is produced in 3rd or 4th years.

**N/B** Stevia leaves have to be harvested carefully, to avoid stressing the plant.

#### **Yield:**

Depending on climate conditions and maintenance one can achieve the yields of 2-4 tons per hectare in 3-6 harvests annually.

#### **Economic Lifespan:**

- The crop's life span is about 5 years with good management.

#### **Post-harvest Handling:**

- After harvesting, the whole plant is dried, and the leaves are separated from the stems for further processing.
- It is recommended to use a net since it requires good air circulation but not excessive heat.
- The stems have very low concentrations of sweet glycosides and are removed to minimize processing cost. Leaves can be ground into powder using electric coffee grinder for 25-30 seconds. Avoid using food dehydrators or open oven doors as this may result in a bitter flavour.
- The dried leaves ground into powder and stored in airtight containers or plastic bags and store in a cool place.
- Dried leaf powder can be directly marketed without further processing by the farmers.

#### **Challenges to Stevia Production**

- Establishment of the crop can be difficult especially when it comes to planting suitable material.
- Labour requirement can be high because of hand planting, harvesting and drying.
- Currently stevia is mainly exported with minima local consumption due to lack of consumer awareness country wide.

#### **Advice to potential growers**

- Although stevia is not considered an easy herb to grow, but it has proved to be quite adaptable and can be cultivated in diverse climatic zones.

- Farmers are normally contracted to produce stevia. The crop has ready market for export.
- Stevia can be grown as a supplementary crop to generate extra income.

## Stevia Seedbeds

| STAGE                  | PRODUCT                         | APPLICATION  |
|------------------------|---------------------------------|--|
| Fumigation             | Basamid Gr<br>or                | Apply 60g/m <sup>2</sup> . Mix to 200mm deep & irrigated to 60% or capacity and cover with tent for 7 days |
| Fumigation             | Metham Sodium                   | Drench 100mls in 4lts water/m <sup>2</sup> . Seal with tent for 7 days                                     |
| Beds Making            | Single Super Phosphate          | 12g/m <sup>2</sup>   |
| Beds Making            | Kynobor                         | 5g per 36m <sup>2</sup> bed  |
| Before Sticking        | Copper Oxychloride              | Apply 150g/36m <sup>2</sup> with 40lts water   |
| At Sticking            | Seradix B no 1                  | Dip cuttings into Seradix  |
| After Sticking         | Kynopop                         | Apply 250g/36m <sup>2</sup> in 40lts water   |
| 1 week After Sticking  | Copper Oxychloride              | Apply 150g/36m <sup>2</sup> with 40lts water   |
| 1 week After Sticking  | Spore Kill                      | Apply with Knapsack (50mls Sporekill per knapsack)   |
| 2 weeks After Sticking | Veggie Oemff Starter            | Apply 8g/36m <sup>2</sup> with 40lts water   |
| 2 weeks After Sticking | Copper Oxychloride              | Apply 150g/36m <sup>2</sup> with 40lts water   |
| 2 weeks After Sticking | Sporekill                       | Apply with Knapsack (50mls Sporekill per knapsack)   |
| 3 weeks After Sticking | Veggie Oemff Starter            | Apply 8g/36m <sup>2</sup> with 40lts water   |
| 3 weeks After Sticking | Potassium Nitrate<br>Greenhouse | Apply 1g/m <sup>2</sup>  |
| 3 weeks After Sticking | Copper Oxychloride              | Apply 150g/36m <sup>2</sup> with 40lts water   |
| 3 weeks After Sticking | Sporekill                       | Apply with Knapsack (50mls Sporekill per knapsack)   |
| 4 weeks After Sticking | Calsap                          | Add 12mls per knapsack. 1 knapsack to 4 beds   |
| 4 weeks After Sticking | Copper Oxychloride              | Apply 150g/36m <sup>2</sup> with 40lts water   |
| 4 weeks After Sticking | Sporekill                       | Apply with Knapsack (50mls Sporekill per knapsack)   |
| Before Planting        | Kynopop                         | Apply 250g/36m <sup>2</sup> in 40lts water   |
| Before Planting        | Potassium Nitrate<br>Greenhouse | Apply 1g/m <sup>2</sup>  |

## Stevia Lands

| STAGE                            | PRODUCT                        | APPLICATION RATE   |
|----------------------------------|--------------------------------|--|
| Before Planting                  | 50 tonnes treated cow manure   |  |
| At Planting                      | Basal Fertilizer               | 400kgs 6.23.23 Blend                                     |
| At Planting                      | Kynopop                        | 10kgs/ha sprayed over top of cutting                     |
| At Planting                      | Velum                          | 1lt/ha drenched into planting holes                      |
| After 1 <sup>st</sup> Irrigation | Liquid Lime (Calsap broadcare) | 2lt/ha   |
| After Planting                   |                                | (Hand control is the best weed control on Stevia)        |
| After Planting                   | Kyno Micro Algae               |  |
| 1 week After Planting            | Copper Oxychloride             | 4.5 kgs/ha in 150 litre                                  |
| 1 week After Planting            | Veggie Oemff Starter           | 2 kgs/ha as a foliar feed                                |
| 2 weeks After Planting           | Copper Oxychloride             | 4.5 kgs/ha in 150 litre                                  |
| 2 weeks After Planting           | GreenGold Top Dressing         | 100kgs/ha (Calcium urea topdressing with boron)          |
| 3 weeks After Planting           | Copper Oxychloride             | 4.5 kgs/ha in 150 litre                                  |
| 3 weeks After Planting           | Veggie Oemff Starter           | 2 kgs/ha as a foliar feed                                |
| 3 weeks After Planting           | Kyno                           |  |
| 4 weeks After Planting           | Copper Oxychloride             | 4.5 kgs/ha in 150 litre                                  |
| 4 weeks After Planting           | Kynoplus Top Dressing          | 150kgs/ha (Slow Release Nitrogen)                        |
| 5 weeks After Planting           | Copper Oxychloride             | 4.5 kgs/ha in 150 litre                                  |
| 5 weeks After Planting           | Veggie Oemff Starter           | 2 kgs/ha as a foliar feed                                |
| 5 weeks After Planting           | Velum                          | 0.5 lts/ha drenched over planted (Water before applying) |
| 6 weeks After Planting           | Copper Oxychloride             | 4.5 kgs/ha in 150 litre                                  |
| 7 weeks After Planting           | Veggie Oemff Grow              | 2 kgs/ha as a foliar feed                                |
| 7 weeks After Planting           | Potassium Nitrate Greenhouse   | 100 kgs/ha   |
| 8 weeks After Planting           | Copper Oxychloride             | 4.5kgs/ha in 150 litre                                   |
| 9 weeks After Planting           | Copper Oxychloride             | 4.5kgs/ha in 150 litre                                   |
| 9 weeks After Planting           | Veggie Oemff Grow              | 2kgs/ha as a foliar feed                                 |

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|-------------------------|---------------------------------|---|
| 10 weeks After Planting | Copper Oxychloride              | 4.5kgs/ha in 150 litre                          |
| 11 weeks After Planting | Copper Oxychloride              | 4.5kgs/ha in 150 litre                          |
| 11 weeks After Planting | Veggie Oemff Fruit              | 2kgs/ha as a foliar feed                        |
| 12 weeks After Planting | Copper Oxychloride              | 4.5kgs/ha in 150 litre                          |
| 13 weeks After Planting | Copper Oxychloride              | 4.5kgs/ha in 150 litre                          |
| 13 weeks After Planting | Veggie Oemff Fruit              | 2kgs/hectare as a foliar feed                   |
| 13 weeks After Planting | Potassium Nitrate<br>Greenhouse | 1kg/hectare as a foliar feed                    |
| After Harvesting        |                                 |   |
| Day After Harvesting    | Veggie Oemff Starter            | 2kgs/hectare                                    |
| Day After Harvesting    | GreenGold Top Dressing          | 120kgs/ha (Calcium urea topdressing with boron) |