SAHELIAN SOLUTIONS FOUNDATION

# Green Grams Hand Book

A guide to farmers within project *"Enhancing food security with Diversified Dry land Farming Techniques in Kitui County*" supported by SASOL Foundation.

## Brief description

Green grams is a leguminous crop of species Vigna native to the Indian sub continent but also cultivated in hot and dry regions of southern Europe, southern united states and eastern Africa. It's an upright bushy plant that can grow to a height of 30-120cm. the color is usually green but can also be found in sheds of black and yellow. The pods are linear sometimes curved, round slender and hairy. Green grams are nutritious source of food with 25% protein content and can also be grown for hay, green manure and cover crop. In Kitui county green grams are grown mainly for sale in local and export market.

Sasol foundation has been promoting the commercialization of green grams within the framework of enhancing food security with DFT Project. This project targets 1500 farmers in Kitui rural and Kitui south sub counties in the year 2014. The strategy of this project aims at increasing agricultural productivity through promotion of drought tolerant crops, moisture retention and conservation, value chain analysis, inculcating business attitude towards farming and creation of market linkages. The capacity of farmers is strengthened through training on appropriate dry land farming techniques, institutional management and business management skills. To achieve this goal, farmers are organized into farmer associations/ groups which in turn come together and form producer and marketing cooperatives. So far the lower Yatta producer and marketing cooperative was formed in 2013 with a current membership of 416.

Farmers join a marketing co-operative to gain more control in marketing their produce so they can:

a) Increase the price for their produce
b) Reduce the cost of marketing their produce
c) Obtain agricultural inputs such as seeds, fertilizers, chemicals
d) Make market for their goods more secure

The whole production cycle and marketing is within the frame work of cooperative.

## TOPIC A. PRODUCTION CYCLE

1. Climatic conditions

   Green grams are best grown at an altitude of 0-1600m above sea level well adapted to sandy loam and clayey soils at pH range of 5.5-7.5. They are drought tolerant with rain fall requirement range between 350- 700mm/annum.
   Heavy rain fall results to increased vegetative growth with reduced pod setting and development. Most parts of Kitui County are favorable for growing green grams.

2. **Land preparation**

Land should be ploughed during the dry spell to allow for aeration and expose soil borne pests to die.

Soil clods should be broken to medium tilth to create a soil structure that encourages seedlings emerge/germinate uniformly and rapidly. Manure should be applied at a rate 200 wheel barrows per acre.

Terracing should be done during land preparation to reduce surface run off and moisture retention for crop sustenance.

3. **Seed varieties and sourcing**.

In Kenyan market the two main varieties are;- N26 and KS20

Table 1: Seeds varieties and characteristics

| Variety | characteristics | Maturity Days | Yield/Acre |
|---|---|---|---|
| N26(Nylon) | Pods turn black when dry grains are shiny green in color flowers in 40-45 days | 60-65 | 3-4 Bags of 90 kgs |
| KS20(Uncle ) | Pods turn brown when dry Grains are dull green in color Flowers in 60-65 days. Grains are bigger in size compared to N26. | 80-90 | 3-4 Bags of 90 kgs |

Farmers are encouraged to plant certified seeds from recognized sources e.g. KARI, Kenya seed company, Dry land seed ltd. Farmers can source seeds from agro vets like Kithimani, snow , Kitundu, Nunguni, Momba and any other outlet which stocks certified seeds.

4. **Planting**

Green grams are planted at rate of 4-6kgs/acre at a spacing of 45cm between rows and 15cm between the plants at a depth of 3-5cm.

When using oxen plough for planting, place the seed at the side of furrow.

Practice crop rotation because green grams have toxic residues and disease organisms that may affect the crop.

5. **Weed management**

Weeds habor pests and competes for nutrients and moisture, therefore timely weed control is done especially two weeks after seeds emergence and before flowering.

Weeds can as well be controlled by use of herbicides. Chemicals are applied before the crop emergences, examples of weeds in include; star grass, amaranths and cleome. Chemical used -*dual gold*.

## 6. Pest and disease management

| | | |
|---|---|---|
| Bacterial blight | Leaves become yellow and fall prematurely | Ridomil gold, |

Integrated pest management (IPM)

Is the use of different available pest control techniques meant to reduce pest's population below the economic injury level. Pesticides should be applied at two strategic times in crops growth, i.e.

a) Before flowering at buds stage
b) After flowering / podding stage

Table 2a-b: Pests and diseases

a. Pests

| Pest | Symptoms | Control |
|---|---|---|
| Thrips | Attacks plant petioles<br>Leaves have tiny holes surrounded by discolored areas. | Thiodan, match,karate, Duduthrin |
| Aphids | They feed on young plants, leaflets, stem and pods of green grams.<br>Attacked young leaves become twisted<br>Excretion of honey dew leads to growth of sooty mould | Thiodan, Sherpa plus, Karate, actara. |
| Pod borers | Feeds on leaves by scrapping tissue<br>Bore into the pods and feed on the seeds<br>They also cause damage to flower buds and flowers | Dimethoate, Sherpa plus |
| White flies | They suck plant sap leading to retarded growth<br>Attacked leaves become shrinked. | Actara, karate, |
| Caterpillars | Attacked leaves and pods are left with windows<br>The pests can be seen moving on the plant | Bestox, karate |
| Foliage beetle | They feed on young plants<br>They become threat when in large quantities. | Thiodan, karate |
| Weevils | They feed on stored grains | Actellic super, skana super, sumi combi. |

b. Diseases

| Disease | Symptoms | Control |
|---|---|---|
| Powdery mildew | White patches appear on leaves and other green parts, which later become dull colored. | Score, thiovit jet |
| Yellow mosaic virus | Appears as decoration on leaves | Benomyl, Copper oxychloride |
| Rust | It appears as circular reddish brown pustules<br>Less abundant on pods and stem | Score, ortiva |

7. Manure and fertilizer application
   Foliar feeds should be applied before flowering and at fruiting stage to boost yield.

8. Harvesting and threshing.
   Physiological maturity harvesting is the stage of growth in which the plant has completed its physiological development or when it has developed enough to provide a useful products to the farmer.
   Harvesting is generally done by hand-picking at weekly intervals. The legumes are harvested when the seed pod s are dry, shriveled and the seeds inside are hard. You can pick and dry individual pods or uproot the whole plant and dry it for about two days, then thresh and clean. Harvesting is the most expensive process in growing green grams.
   Threshing –can be done using either mechanical or manual methods, in mechanical u can use pulse thresher which makes work easier and faster, manually u can use beating stick. To avoid dirt and foreign materials spread on polythene paper. Winnow to separate grains from foreign materials.

9. Storage
   Storage structures; -Fumigate the store, let it be aerated, leak proof and avoid dampness.
   The grains should be dusted by use of any of the following chemicals;
   Actellic gold dust, Sumi combi, Skana super, blue cross.
   - Actelic super 50gm/90kgs
   - Sumi combi 30gm/90kgs
   - Skana super dust 50gm/90kgs
   - Spintor laclan 50gm/90kgs
   - Blue cross/Malathion 50gm/90kgs

   NB; follow manufacturer's application manual

## TOPIC B: MARKETING STRATEGY

a) Grading.
Enables farmers to have quality in their produce which leads to high demand hence high selling price.
There are three grades of green grams {CD-ARS 865:2012(E)}

Table 3: Specific requirements

| Characteristics | | Maximum limits | | | Method of test |
|---|---|---|---|---|---|
| | | Grade 1 | Grade 2 | Grade 3 | |
| Moisture % max m/m | | 14.0 | 14.0 | 14.0 | ISO 24557 |
| Purity % Max m/m | | 99.0 | 99.0 | 99.0 | ISO 605 |
| Defective,% max m/m | | 2.0 | 4.0 | 6.0 | |
| Immature grain % max m/m | | 2.0% | 3.0 | 4.0 | |
| Contrasting classes | | 0.5% | 1.0 | 2.0 | |
| Classes that blend max % m/m | | 5.0% | 10.0 | 15.0 | |
| Germination, excluding hard seeds | | 90% | n/a | n/a | |
| Sprout test | | suitable | n/a | n/a | |
| Foreign material,% max m/m | Organic | 0.65 | 0.65 | 0.65 | |
| | Inorganic | 0.25 | 0.25 | 0.25 | |
| | Filth | 0.1 | 0.1 | 0.1 | |
| Other edible grains % max m/m Any edible grain (including oilseeds) other than green grams | | 0.1 | 0.5 | 3.0 | |
| Inset/pest damaged % Max m/m, Grains per cent by count clean-cut weevil bored | | 1 | 2 | 3 | |
| Total Aflatoxin (AFB1+AFG1+AFG2), ppb | | 10 | | | ISO 16050 |
| AflatoxinB1 only, ppb | | 5 | | | |
| Fumonisin, ppm | | 2 | | | AOAAC 2001.04 |

## Ungraded green grams

Ungraded green grams shall be green grams which do not fall within the requirements of grades 1,2 and 3of this standard but meet the minimum requirements provided in 4.1 and are not rejected green grams. Ungraded green grams can be sorted out to grade 1,2 or 3 in accordance with the relevant procedures.

## Rejected grade green grams

Reject green grams shall be peas which are musty, sour, heating, materially weathered or weevily,which have any commercially objectionable odour; which contain insect webbing or filth, animal filth, any unknown foreign substance, broken glass or metal fragments ;or which are otherwise of distinctly low quality. The characteristics are within the parameters specified in table 3.They cannot satisfy the conditions of under grade green grams and shall be graded as reject green grams and shall be regarded as unfit for human or animal consumption.

### b) Packaging and bulking

Should be done in 90kg polythene bags, checked and certified. Farmers to deliver their produce to the central collection store and issued with a delivery receipt/slip after checking and confirming the weight and grade. Bag should be labeled according to grade and variety.

### c) Pricing.

Price of green grams ranges from 40 to ksh.100 per kg depending on quality, seasonality and market forces of demand and supply.

### d) Promotion.

This is done through exhibitions of the product at platforms and events that bring together various actors within the value chain. Such platforms include; farmers field days and market events that bring together input suppliers, traders, extension service providers, financial institutions, private companies and government agencies.

Product samples are presented and demonstrated to potential buyers.

### e) Linkage to buyers.

Based on the quality and quantity of the produce, the cooperatives shall be linked to the following categories of buyers;

Table 4: Buyers

| Category | Examples | Requirements |
|---|---|---|
| 1. Exporters | Capital reef, Hidery, Regal(Mombasa) | • At least 300bags of 90kg (27tonnes) of either N26 or KS20 or both. |
| | Export company(Nairobi) | • Grade 1 of KS20 |
| 2. intermediary buyers | Kamili, pisu, | • Both varieties but prices vary with quality. |
| | Spice world | • Grade 1 of N26 |
| 3. Local buyers | Daystar, Amkem investment | • Both varieties but prices vary with quality and quantity. |

Table 5: Green grams- Break even

| Green gram activities/cost per farmer per 2 acres | | |
|---|---|---|
| Expenditure | | income |
| Activities | Ksh. | Ksh. |
| Farm inputs e.g seeds ,chemicals fertilizer | 1850 | 6 sacks of 90kgs selling at 70 shillings per kg |
| Planting and weeding | 4000 | |
| Harvesting | 4000 | |
| Transport | 500 | |
| storage | 200 | |
| Co-p charges | 500 | |
| Total | 10500 | 37800 |
| Gross profit | 27300 | |