

## **GARDEN PEAS GROWER'S MANUAL**

**Scientific name:** *Pisum sativum L*

**Common name:** Minji

**Local name:** Swahili, Mbaazi za bustani



Photo: iStock

### **1. Introduction**

Garden pea (*Pisum sativum L.*) belongs to the family Fabaceae which consist of other plants like common beans, soy beans lentils (kamande) and peanuts.

#### **1.1 Uses**

Garden peas are sold fresh or dried, shelled or in mixed prepacks with other vegetables. They can be boiled and mashed in local food like mukimo or in stews. They can also be dried, powdered and used in soups or seasoned and roasted as a tasty snack. Garden peas are high in protein, dietary fiber and potassium and low in sodium. They are a good source of B-vitamins, especially folate and thiamine, as well as vitamins A, C, and E (Rebello et al., 2014).

#### **1.2 Varieties**

Garden peas varieties include: Green feast, Ambassador, Kelvedon (kigondoro), Alderman and summer wood. The choice of varieties to grow will be guided by market survey findings.

#### **1.3 Counties where grown**

In Kenya, the major production counties are; Nyandarua, Nakuru, Meru, Uasin Gishu and Laikipia among others.

#### **1.4 Ecological requirements**

Garden peas grow best in the cool humid highlands under the following conditions;

- Altitude: 750m above sea level and above
- Rainfall: Well distributed rainfall above 400-500mm per growing season
- Temperature: Optimum- 19-23 °C
- Soils: Well drained with high organic matter and pH of 6.0-7.5. Lime should be applied if the pH falls below 6.0

## **2.0 Good Agricultural Practices (GAPs)**

Horticulture industry in Kenya is guided by a code of practice KS1758 which is a standard for flowers, vegetable, fruits, herbs and spices for both local and export market. The standard aims at ensuring food safety, environmental sustainability and social accountability by following good agricultural practices from production, processing, transportation and marketing of fresh produce.

The manual seeks to adopt climate smart technologies aimed at increasing production and productivity, enhancing resilience and reducing GHG emissions.

### **2.1 Crop Establishment**

Before crop establishment, there is need to develop a cropping calendar as guided by market survey findings.

#### **2.1.1 Land preparation**

Land preparation should involve, ploughing and hollowing the soil sufficiently to achieve a fine tilth, debris and clog free soil. Incorporate 8 tons of farm yard manure in one acre of land.

#### **2.1.2 Soil and water testing**

Soil testing is recommended before planting to guide on fertilizer and manure application and irrigation water suitability.

#### **2.1.3 Planting**

Sourcing of planting materials should be from certified sources or registered stockists.

#### **2.1.4 Seed rate**

Seed rate is 15 kgs per acre.

#### **2.1.5 Spacing**

Dig the planting holes at 2 cm deep and Plant the seeds at 10cm by 45cm for the short varieties that don't require support and at 10cm by 60 cm for long varieties that require support.

## Planting spacing for garden pea



## 2.2 Crop Management

### 2.2.1 Crop water requirement

This is determined by the stage of the crop, soil type and prevailing climatic conditions. Water requirement of between 450mm and 500mm per growing season is optimum. Otherwise irrigation is necessary during flowering and pod development.

### 2.2.2 Crop Nutrition

The crop nutrition is summarized in the table below.

Table 1

Input Type	Applications	When to apply	Amount to apply
Manure	First application	Farrow preparation	2.5 Tons per acre
DAP	Second application	Planting	50kg per acre
NPK	Third application	Four weeks later	50kg per acre

### 2.2.3 Weeding

Garden peas require shallow cultivation to avoid damaging plant root system. This is done when the weeds are small to prevent the weeds from competing with the target crop for growth factors such as nutrients, sunlight, space, and water, as well as harboring pathogens that directly affect the performance of the crop.


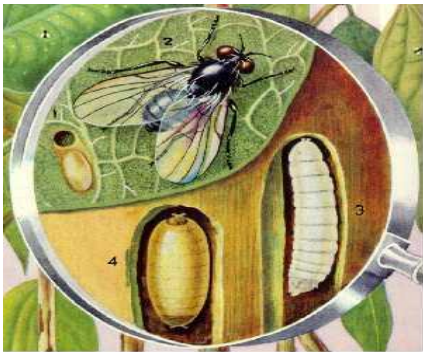
### 2.2.4 Support/Staking




Many of the Garden pea varieties are self-supporting during growth. However, taller gardenpea varieties are more productive and easier to harvest if supported. Plant support is done by guiding the young plants towards the support structure as soon as they start developing long enough shoots to climb. Wooden poles and string are used as ideal supports for peas.

## 2.2.5 Pest and Disease Management



Integrated crop management (ICM) is the best option for food safety. These practices include scouting of pests, field hygiene, proper spacing, physical methods, biological methods like use of pheromone traps and others that will only give option of using Pest Protection Products as last option. The products must be registered for use on the crop in Kenya. ([www.pcpb.go.ke/list-of-registered-products/](http://www.pcpb.go.ke/list-of-registered-products/))


### Major pests and diseases (Table 2)

Pest	symptoms	Control
<b>Cut worm (<i>Agrotis segetum</i>)</b> Noctuidae family  Photo: Greenlife Crop Protection Africa	Cut down the stem of seedlings, Plant falls, withers and dies.	<ul style="list-style-type: none"> <li>-Use of beneficial parasites and natural enemies, e.g. fireflies, birds, parasitic wasps.</li> <li>-Early ploughing to reduce the number of eggs deposition.</li> <li>-Hand picking the cutworms</li> <li>-Chemical method; Drench the insecticide is into the soil.</li> </ul>
<b>Peas stem fly (<i>Ophiomyia phaseoli</i>)</b>  Photo: TNAU Agritech Portal	<ul style="list-style-type: none"> <li>-Maggots bore into the stem causing withering and ultimate drying of the affected shoots</li> <li>-Dropping of tender leaves</li> <li>-Adults puncture the leaves making them turn yellow.</li> <li>-Stunting of plants at 2-3 leaf stage.</li> <li>-Swelling and ribbing of the stem where the maggots and pupae are present</li> </ul>	<ul style="list-style-type: none"> <li>-Plant pest tolerant varieties</li> <li>-Crop rotation practices</li> <li>-Remove and destroy crop residues after harvest to kill the larvae or pupa of the pea stem fly</li> <li>-Spray neem oil extracts</li> <li>-Spray with systemic insecticides a week after germination</li> </ul>


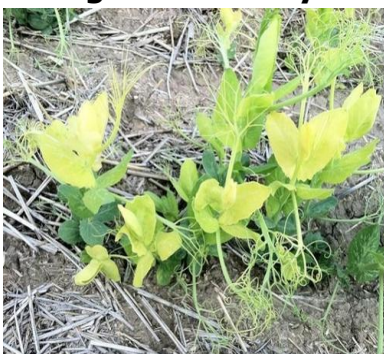
	<ul style="list-style-type: none"> <li>-Reduced bearing capacity of the host plants.</li> <li>-Death of the seedling.</li> </ul>	
<b>Leaf miner</b> ( <i>Liriomyza huidobrensis</i> )  <p>Photo: Koppert</p>	<ul style="list-style-type: none"> <li>-Mining on the leaf tissue</li> <li>-Presence of entry or exit holes from where the larvae have damaged the plant tissue.</li> <li>-Presence of live larvae especially underneath the leaves</li> <li>-Soft, brown and rotten patches on the plant surfaces</li> </ul>	<ul style="list-style-type: none"> <li>-Use of tolerant varieties</li> <li>-Remove and safely discard plant parts that have been infested by the pest.</li> <li>-Maintain an optimum level of the Nitrogenous fertilizer</li> <li>-Keep an extensive drainage system as flooding increases the infestation rate</li> <li>-Use traps to mass catch the pests.</li> </ul>
<b>Aphids</b> ( <i>Acyrtosiphon pisum</i> )  <p>Photo: Infonet Biovision</p>	<ul style="list-style-type: none"> <li>-Aphids feed by piercing and sucking sap from tender shoots and leaves thus transmit Mosaic virus disease.</li> <li>-Young shoots and leaves become stunted</li> <li>-Leaves are curled and twisted.</li> </ul>	<ul style="list-style-type: none"> <li>-Crop rotation</li> <li>-Weeding</li> <li>-Apply a strong jet of water to dislodge aphids from attacked plants.</li> <li>-Remove and destroy infested leaves.</li> <li>-Biological control like parasitic wasp –</li> <li>-Spray neem-based insecticides</li> <li>-Spray pyrethrin based pesticides/</li> </ul>
<b>Spiney pod borer</b> ( <i>Etiella zinckenella</i> )  <p>Photo: TNAU Agritech Portal</p>	<ul style="list-style-type: none"> <li>-Caterpillar makes holes in pods and feed on emerging seed.</li> <li>-Late varieties are prone to more damage than earlier one.</li> <li>-Chewing damage of the seeds inside the pod.</li> <li>-Caterpillar fills the inside of the pod with webbing, on</li> </ul>	<ul style="list-style-type: none"> <li>-Deep ploughing before planting to eliminate inactive pupa.</li> <li>Plant early sowing, short-duration varieties.</li> <li>-Avoid closer plant spacing.</li> <li>Use the pheromone traps 5-7 traps/ha</li> <li>-Spray with biopesticides-Neem products</li> </ul>




	<p>which small pieces of faeces can be found.</p> <ul style="list-style-type: none"> <li>-Larva's head is found inside the pods while the rest of the body hanging out.</li> <li>-Presence round holes on buds, flowers or pods. older pods marked with a brown spots.</li> </ul>	
<p><b>Fusarium wilt</b> (<i>Fusarium oxysporum f. sp. pisi</i> (Fop))</p>  <p>Photo: Samuel Markell, NDSU</p>	<ul style="list-style-type: none"> <li>-Yellowing of lower leaves and stunting of plants.</li> <li>-The xylem vessels develop brown discoloration and get distorted.</li> <li>-Leaflet margins curl downward and inward.</li> <li>-The stem may be slightly swollen and breakable near the soil level.</li> <li>-Wilted plants may die.</li> </ul>	<ul style="list-style-type: none"> <li>-Crop rotation</li> <li>-Practice good sanitation practices.</li> <li>-Use certified disease free seeds</li> <li>-Soil solarization</li> </ul>
<p><b>Powdery mildew</b> (<i>Erysiphe pisi var. pisi</i>)</p>  <p>Photo: Greenlife Crop Protection Africa</p>	<ul style="list-style-type: none"> <li>-Powdery mass on both sides of the leaves and later on the stems and pods.</li> <li>-Plants become stunted, turn yellow and defoliate.</li> <li>-Grey-brown discolouration of the seeds</li> </ul>	<ul style="list-style-type: none"> <li>-Plant tolerant varieties</li> <li>-Rotate with non-host crops such as potato, maize, wheat or other grains</li> <li>-Ensure proper spacing between plants for free air circulation</li> <li>-Early seeding for late-maturing pea crops.</li> <li>-Maintain field sanitation/hygiene</li> <li>-Avoid heavy application of fertilizer.</li> <li>-Minimize field movements from infected areas to non-infected areas.</li> </ul>

<p><b>Rust (<i>Uromyces fabae</i>)</b></p>  <p>Photo: Infonet Biovision</p>	<ul style="list-style-type: none"> <li>-Leaves of infected plants exhibit many small, orange-brown pimples usually at the lower surface.</li> <li>-Severely infected leaves wither and may drop from the plant.</li> <li>-Larger pimples occur on the stems and isolated pimples may be found on the pods.</li> <li>-Severe infection may result in reduced seed size and may cause yield losses of up to 30%</li> </ul>	<ul style="list-style-type: none"> <li>-Select rust-resistant plant varieties.</li> <li>-Pick off and destroy infected leaves and remove all fallen debris.</li> <li>-Apply copper or Sulphur sprays early or at first sign of disease.</li> <li>-Stake (support) plants and remove weeds to improve air circulation.</li> </ul>
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**Deficiency Symptoms (Table 3)**

Nutrient	Symptoms	Management
<p><b>Phosphorous Deficiency</b></p>  <p>Shep plus 2016</p>	<ul style="list-style-type: none"> <li>-Reduced early growth, stunting and darkening of the whole plant.</li> <li>-Reddening of the stems, petioles, tendrils and leaf margins.</li> <li>-Older leaves develop mottled chlorosis (yellowing of the leaves and may acquire a purplish discoloration).</li> </ul>	<ul style="list-style-type: none"> <li>-Application of phosphatic fertilizer during planting at bands 2-3 cm away from the seeds to avoid scorching.</li> <li>-Conduct soil test to determine the phosphorous level in the field prior to planting.</li> <li>-Use foliar fertilizer rich in phosphorous</li> </ul>
<p><b>Nitrogen deficiency</b></p>  <p>Shep plus 2016</p>	<ul style="list-style-type: none"> <li>-Slow or stunted growth of the plants</li> <li>-Small leaves</li> <li>-Yellowing of leaves</li> <li>-Excessive leaf drop in severe cases</li> <li>-Poor seed or flower production</li> </ul>	<ul style="list-style-type: none"> <li>-Treat the soil with nitrogenous fertilizers like Urea, Ammonium Nitrate or fish emulsion</li> <li>-Use of organic matter such as compost or manure</li> <li>-Avoid over watering or irrigation. Excessive</li> </ul>

		water in the field leaches the Nitrogen.
<b>Potassium deficiency</b>  Shep plus 2016	-Brown scorching -Older leaves will appear burnt at the edge's -Curling/cupping of leaves -Chlorosis (yellowing) between leaf veins. -Purple spots on the underside of the leaves.	Top dressing with potassium rich fertilizer

## 2.3 Harvesting

### 2.3.1 Maturity indices

The maturity period of garden peas is 75 to 90 days. This varies depending on variety and growing conditions (soil, temperatures, and moisture). Garden peas are picked when pods are round (swollen)/ fully expanded but immature, just before they become hard and starchy.

### 2.3.2 Harvesting method

To avoid damaging the stem, use one hand to hold the pea vine and the other hand to pull off the pea pods. Use bucket for harvesting. Pick pods once per week for four weeks. Early picking also helps to extend flowering and cropping by preventing seed setting.

### 2.3.3 Expected yields

Expected yield of 3 to 3.5 tons per acre is achievable with good crop management.

## 2.4 Post-Harvest Handling Activities

### 2.4.1 Sorting and grading

This should be done to remove damaged and pest infested pods, this should be done in a cool, clean collection shed.

### 2.4.2 Packaging, transporting and storage

Harvested peas pod should be packaged in crates or cartons to maintain quality and transported in closed trucks as per the crops (Horticultural crops) Regulation 2020. Fresh unshelled peas can be stored for two weeks at a temperature of 10°C and 90-95% relative humidity.



### 2.4.3 Shelling

Shelling of garden peas is done for local and export market. Shelling percentage is 2:1 for non-shelled to shelled peas i.e (You can get 1 kg of shelled peas from 2kgs of non-shelled peas). The shelled garden peas are packed in punnets, nets or sleeves and stored in cold room to maintain the quality.

### 3.0 Gross Margin Analysis (1 Acre) as at 2024

Item	Unit	Quantity	Cost/unit	Total Amount in (Ksh)	
				Season 1	Season 2
<b>Gross Income</b>	Ksh	3,000	50	<b>150,000</b>	<b>150,000</b>
<b>Production cost</b>					
Ploughing	Acre	1	6,000	6,000	6,000
Harrowing	Acre	1	3,000	3000	-
Manure	Tons	8	1,000	8,000	-
Seeds	Kgs	15	700	10,500	10,500
Furrow making	Mds	7	300	2,100	2,100
Planting	Mds	10	300	3,000	3,000
Fertilizer - (DAP)	Kgs	50	120	6,000	6,000
Fertilizer-(NPK 17:17:17))	Kgs	50	80	4,000	4,000
Weeding - 1 <sup>st</sup> Weeding	Mds	10	300	3,000	3,000
Weeding - 2 <sup>nd</sup> Weeding	Mds	10	300	3,000	3,000
Sticks (Stakes)	Pcs	2,000	4	8,000	-
Sticking	Mds	3	300	900	900
Twine	Pcs	10	150	1,500	1,500
Labour for twine	Mds	12	300	3,600	3,600
Pesticides	Lts	2	1,000	2,000	2,000
Spraying pesticide (Knapsack)	Nos.	40	50	2,000	2,000
Fungicides	Gms	800	10	8,000	8,000
Spraying fungicide (Knapsack)	Nos.	10	50	500	500
Foliar Feeds	Lts	2	800	1,600	1,600
Harvesting(4 harvests)	Mds	40	300	12,000	12,000
<b>Total production cost</b>				<b>88,700</b>	<b>75,200</b>
<b>Gross margin</b> (Gross income-Total production cost)				<b>61,300</b>	<b>74,800</b>

## References

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