

Seed Potato Diffuse Light Store (DLS)

What is Diffuse light store

This is storing seed potato on trays or shelves and with the use of natural indirect light and surrounding environment conditions. It is easy to construct diffused light store with available materials like woods, mud and plastics.

How it works

Diffuse light store work with natural sunlight and ventilation from the surrounding air to enhance good sprouts and to reduce storage loss of seed potato.

Light:

Natural light from the sun should be indirect but sufficient to ensure that tuber sprouts are short, firm and coloured. Storing seed potato in darkness encourages long, white and weak sprouts and this causes easy and fast shrinkage of the tuber, therefore in the DLS, tubers should be arranged into a 3 inches layer to ensure that each tuber receives sufficient diffused light and air. The diffused light is provided by installed translucent iron sheets.



Newly constructed diffused light store at Egerton University

Ventilation:

Air supply should be efficient and sufficient for the tuber to breathe and respire, since it is a living cell. A lot of heat encourages fast weak sprouting and shrinkage of tuber (loss of water). In order to manage ventilation or simply temperature regulation, the wall of a diffuse light store should be spaced to at least 3.5 inches to sufficiently provide the air circulation inside the DLS. Temperature inside a diffused light store should range between 15°C to 18°C and a relative humidity of not less than 95%.



Seed potatoes arranged on shelf inside a DLS



Seed potato inside a Diffuse light store



Long and white sprouts associated with storing seed potato in darkness



Seed Potato Diffuse Light Store (DLS)

Protection: Diffused light store provides protection to stored seed potato from destroying agents like the rats, moths and thieves. Walls should be constructed installed with small fined nets to protect entry into the diffused light store. Storage time for seed potatoes in a diffuse light store ranges between 5 to 6 months, varying with the varieties.

Note! *Cost of building one can start from as low as 50,000sh, depending on materials to use.*

Reasons for storing seed potato in a Diffused Light Store:

- 1.To encourage stronger, colored and firm sprouts of potato tuber.
- 2.To avoid weight loss and quality loss of seed potato.
- 3.To allow seed potato to break dormancy

What we offer;

The CARP+ Seed Potato Value Chain offers the following training Programs;

1. Seed Potato Productions under Aeroponics and Hydroponics Systems
2. Seed Potato Production and Management under field conditions
3. Seed Potato Harvesting and Post-Harvest Handling
4. Seed Potato Diffuse Light Storage Construction and Management
5. Water Harvesting and Smart Water Farming

We train Farmers Group as Well as Individual Farmers

For Further Information

Visit our Website at <http://cawsacentre.egerton.ac.ke>

Email us on: carp.potato@egerton.ac.ke or akibe@egerton.ac.ke

Call us on: 0721402957 or 0723079623

Author: Rugut Enock
email: enockrugut@outlook.com
Mobile: +254726629474
Edited by Kibe A.M



Supported by
RUFORUM through the CARP+ Seed Potato
Value Chain Project



Potato Cyst Nematode (PCN)

What is Potato Cyst Nematode (PCN)?

Potato cyst nematode (PCN) is a serious nematode pest of potato. It can also attack other crops such as tomato and capsicum which are in the same family with potato. The pest is very small and can only be seen with a magnifying glass or microscope. The pest can reduce yields of potato by up to 80%.

How to Identify PCN

The eggs hatch to release worm-like nematodes called Juvenile 2 (J2). The J2 nematode enters the roots and starts feeding from inside. The roots may swell around the area of attack. Feeding nematodes block the

movement of water and useful nutrient that the potato needs to grow. As the nematode grows, it forms into mature male or female and comes out of the root. Females die when they mature and become round and smooth in shape and have a pinhead or pointed beak. Potato crops attacked by PCN have depressed growth and may have yellowing and wilting symptoms even when there is enough water and nutrients in the soil.



Mature cysts on roots



*Canola, Sorghum, Lucerne
Rotation for PCN management*

Control of PCN

Potato production fields should be certified and declared PCN free. Farm machinery and equipment must always be cleaned and disinfected before entry into the farm.



*Mature female with pinhead
or pointed beak*



Golden yellow cysts on potato roots

Potato Cyst Nematode (PCN)

People entering potato production fields must disinfect their boots and be in protective clothing such as clean dust coats or overalls. Use seed potato from certified sources such as Egerton University, ADC Molo, KARLO Tigoni, Agrico E.A etc.

Avoid growing potato continuously on the same field and instead rotate with other crops such as canola, sorghum, lucerne, beans, peas, maize, cages, and others that are not in the potato family. For seed potato production, observe at least 3 years before planting seed potato in the same field.

Chemicals such as Velum can be used carefully on infected fields by trained personnel

What we offer;

The CARP+ Seed Potato Value Chain offers the following training Programs;

1. Seed Potato Productions under Aeroponics and Hydroponics Systems
2. Seed Potato Production and Management under field conditions
3. Seed Potato Harvesting and Post-Harvest Handling
4. Seed Potato Diffuse Light Storage Construction and Management
5. Water Harvesting and Smart Water Farming

We train Farmers Group as Well as Individual Farmers.

For Further Information

Visit our Website at <http://cawsacentre.egerton.ac.ke>

Email us on: carp.potato@egerton.ac.ke or akibe@egerton.ac.ke

Call us on: 0721402957 or 0723079623

Author: John Nganga

email: jngash02@gmail.com

Mobile: +254723079623

Edited by Prof. A.M Kibe and Judith Oggema

Supported by
RUFORUM through the CARP+ Seed Potato
Value Chain Project



Cocoyam (Taro/Nduma) production under rain fed

Benefits of Taro

Cocoyam is a common name for more than one tropical root crop and vegetable crop belonging to the Arum family (Araceae). Cocoyams are grown primarily for their edible roots and it can be boiled, fried or roasted for consumption. It can be dried and used to make flour or sliced and fried to make chips.

Taro Description

Originated in South East or Central Asia.

Cocoyams are cultivated as food crops. They generally

comprised of a large spherical corm (swollen underground storage stem) which form the edible part. It

is from this that a few

large leaves emerge. The petioles of the leaves stand erect. The leaf blades are large and heart-shaped.



Planted young suckers of Nduma

Propagation

Recommended plant spacing is 1m*1m. They are planted in holes of 45cm in

depth. Loosen the soil lightly around the planting hole and add dried mulch, cover with well mixed top soil composed of farm yard manure and place sucker. Cover the sucker with a thin layer of soil to enable it stand upward.



Edible part of cocoyam

The large size of the hole retains surface water runoff for future use by the young growing sucker. Control weeds either by weeding three weeks after crop establishment using a hand hoe or use of selective

Cocoyam (Taro/Nduma) production under rain fed

herbicides such as diuron, atrazine, trifluralin, ametryne or nitrofen. Matures after eight months. The harvesting is done by shaking up the plant and uprooting it and bringing out the corms while those remaining in soil are dug out. Expected yield is 6.2mt/ha.



What we offer;

The CARP+ Seed Potato Value Chain offers the following training Programs;

1. Seed Potato Productions under Aeroponics and Hydroponics Systems
2. Seed Potato Production and Management under field conditions
3. Seed Potato Harvesting and Post-Harvest Handling
4. Seed Potato Diffuse Light Storage Construction and Management
5. Water Harvesting and Smart Water Farming

We train Farmers Group as Well as Individual Farmers.

For Further Information

Visit our Website at <http://cawsacentre.egerton.ac.ke>

Email us on: carp.potato@egerton.ac.ke or akibe@egerton.ac.ke

Call us on: 0721402957 or 0723079623

Author: Irene Judith Okello
Email: ireneokello44@gmail.com
Mobile: +254716784718
Edited by: judynata@gmail.com
dorcasnyabeta@gmail.com

Supported by
RUFORUM through the CARP+ Seed Potato
Value Chain Project



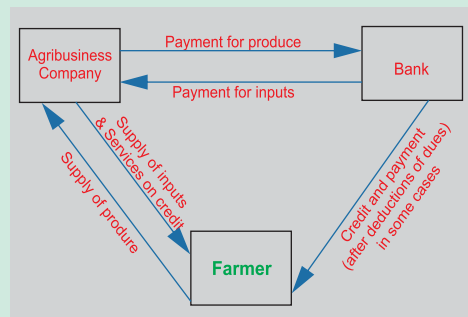
Contract Farming

What is Contract Farming?

It is an agreement between a farmer and marketing firms for the production and supply of farm products. It is done mostly under predetermined prices of the farm products. In an age of expanding agribusiness, there is a danger that small-scale farmers will find difficulty in fully participating in the market economy, but through contract farming this gap can be filled.

How it works

The farmer agrees to provide agreed quantities of a specific agricultural product. The products should meet the quality standards of the purchaser and be supplied at the time determined by the purchaser. In turn the buyer commits to purchase the product and, in some cases to support production through, for example supply farm inputs, land preparation and advice.



Process of contract farming

Importance

1. The benefits of contract farming is it offers both an assured market and access to production support
2. Although contract farming is considered as a commercial business, it has also been viewed as an effective approach to help solve many of market access and input supply problems faced by small scale farmers
3. The produce of contract farming is usually of high quality



Contract Farming

4. This arrangement helps to integrate the smallholder farmer into modern agricultural value chains, providing them with the technical assistance in the production process
5. Farmer gets exposure to world class agro technology Planting materials/healthy disease free nursery
6. Promotes long term planning and investments

NB: A price support scheme can also be an agreement set in order by the government, where the government agrees to purchase the surplus of at a minimum price. i.e. subsidy.

The problems facing contract farming

- Small size of farmer landholdings.
- Need to contract with a larger number.
- No mechanism to discourage default.
- No Legal recourse when faced with large scale contravention of contracts.
- Lack of a comprehensive crop insurance
- Scheme to protect against natural calamities.

	Contract Farming	Price Support
1.	Planting Material Supplies	Usually None
2.	Technology Transfer	None
3.	Assured Price	Minimum Guaranteed
4.	Assured Quantity	No Assured Quantity
5.	Free Equipment	No Free Equipment
6.	Partnership Approach	Usually Adversarial

For Further Information

Visit our Website at <http://cawsacentre.egerton.ac.ke>

Email us on: carp.potato@egerton.ac.ke or akibe@egerton.ac.ke

Call us on: 0721402957 or 0723079623

Author: Eric Kagotho

Email: erickagotho@outlook.com

Mobile: +254718431101

Edited by: Prof A.Kibe

Supported by
RUFORUM through the CARP+ Seed Potato
Value Chain Project



APICAL ROOTED CUTTINGS

PRODUCTIVITY

What are apical rooted cuttings?

Apical cuttings originate from tissue culture material, i.e. the mother plant is maintained in a vegetative (juvenile) state throughout the production cycle.

Rather than allowing tissue culture plantlets to mature and produce minitubers in the screenhouse, cuttings are produced from the plantlets by taking single or double node cuts from lateral shoots.



Potato apical rooted cuttings

Yield potential

The use of high quality seed micro-tubers, produced using apical rooted cuttings (ARCs) has the potential to even triple productivity and thereby increasing food needs without increasing land use. Not less than 1000 cuttings are needed in one acre.



Potato Cuttings in trays

Variety	No of tubers per plant	Total Yield Potential (Kg/m ²
Shangi	18.0	4.3
Wanjiku	16.0	2.2
Mayan Gold cuttings	21.0	2.5
Nyota cuttings	26.0	6.2

APICAL ROOTED CUTTINGS PRODUCTIVITY

Advantages of apical rooted cuttings

- ✓ No need to break dormancy hence faster propagation.
- ✓ It's economical and
- ✓ Has a high rate of multiplication.

Therefore, Farmers are informed that they need to practice the growing of potato ARCs with the same care as they do with tomato, kale or cabbage seedlings

What we offer;

The CARP+ Seed Potato Value Chain offers the following training Programs;

1. Seed Potato Productions under Aeroponics and Hydroponics Systems
2. Seed Potato Production and Management under field conditions
3. Seed Potato Harvesting and Post-Harvest Handling
4. Seed Potato Diffuse Light Storage Construction and Management
5. Water Harvesting and Smart Water Farming

We train Farmers Group as Well as Individual Farmers.

For Further Information

Visit our Website at <http://cawsacentre.egerton.ac.ke>

Email us on: carp.potato@egerton.ac.ke or akibe@egerton.ac.ke

Call us on: 0721402957 or 0723079623

Author: Felistus Makau
Email: fellymakau@gmail.com
Mobile: +254714097915
Edited by: Prof A.Kibe

Supported by
RUFORUM through the CARP+ Seed Potato
Value Chain Project



Management of late blight (*Phytophthora infestans*) in seed potato (*Solanum tuberosum*)

A fungal potato disease

Late blight *P. infestans* is the most dreadful disease in potato worldwide. It is caused by a fungus like pathogen that attacks potato and tomato. The disease **cause yield losses of up to 100%**



A healthy potato field

crop loss if poorly managed. It can also lead to poor tuber quality and yield losses by affecting all the plant parts such as leaves, stems and tubers. The pathogen can stay in the soil for up two to three weeks before it clears. It can still also be transmitted through infected seed potato. This disease is spread by wind or water.

How to identify it

Leaf symptoms:

Pale green water soaked spots of about 2mm-10mm diameter on the margins and tips. These spots enlarge, become necrotic and black killing the entire leaf. The lower side of the leaf usually contains a whitish cotton growth.



Potato late blight

Stem symptoms: Light brown lesions that elongate and encircle the stem and the petiole breaking and killing the plant.

Tuber symptoms: The flesh has a rusty brown discoloration. The surface is usually hard with depressions with purplish tinge on the sides.

Management of late blight (*Phytophthora infestans*) in seed potato (*Solanum tuberosum*)

Management

1. Do timely planting
2. Practice crop rotation with other non solanaceous crops such as maize, beans, cocoyam, and canola
3. Use certified seed potato during planting: this will minimize on the disease Incidences.
4. Spray recommended fungicides such as ridomil (50g into 20L of water and infinito (35ml into 20L of water) in alternation to avoid development of disease resistance.

What we offer;

The CARP+ Seed Potato Value Chain offers the following training Programs;

1. Seed Potato Productions under Aeroponics and Hydroponics Systems
2. Seed Potato Production and Management under field conditions
3. Seed Potato Harvesting and Post-Harvest Handling
4. Seed Potato Diffuse Light Storage Construction and Management
5. Water Harvesting and Smart Water Farming

We train Farmers Group as Well as Individual Farmers.

For Further Information

Visit our Website at <http://cawsacentre.egerton.ac.ke>

Email us on: carp.potato@egerton.ac.ke or akibe@egerton.ac.ke

Call us on: 0721402957 or 0723079623

Author: Millicent Wasolo

Email: Milcentwasolo@gmail.com

kibeanto@gmail.com

Mobile: +254704266272

Edited by: Prof. A. M. Kibe; Judith Oggema

Supported by
RUFORUM through the CARP+ Seed Potato
Value Chain Project



Solar pump driven irrigation

What is Solar irrigation?

Irrigation is applying controlled amounts of water to plants at intervals to help grow agricultural crops. Solar irrigation is the use of the sun's energy to power a pump which supplies water to crops to help growth.



Solar panel, battery and pump

How it works

The sun strikes the solar panel which converts solar energy into electrical energy {Solar panels must be set up facing directly to the sun for maximum sunlight conversion into electricity}.

Steps :

1. The battery takes 2hrs to fully charge.
2. Connect the pump into the battery,
3. Connect the hose pipe to the pump, and submerge the pump into the well or borehole.
4. Then connect the sprinklers to the hose pipe and turn on the battery the battery can pump water continuously for 8hrs.
5. After pumping disconnect the pump from the battery and store the equipment's in a cool dry place.

Key Benefits

1. Solar water pumps can really reduce the amount of labour and time that is needed to irrigate your crops. Just connect it to your chosen irrigation method, turn on your solar pump and it does all the work for you.



French Beans using solar powered drip irrigation

2. Solar is a reliable source of energy for pumping of irrigation water in remote areas, particularly in areas that are not connected to the electricity grid

Solar pump driven irrigation

3. Through improved access to energy and water, solar powered irrigation system can help to stabilize, increase and diversify production i.e. vegetable production during dry seasons to complement staple crops. Excess produce can be sold on markets and generate income.
4. Solar energy is environmentally friendly. Unlike some energy sources such as biogas and coal, solar power doesn't emit greenhouse gases.

Benefits to the government

- ✓ Reduction in electricity and fuel use
- ✓ Subsidy savings
- ✓ Reduced fuel imports
- ✓ Creation of small businesses/employment across the value chain
- ✓ Improved reliability of power systems
- ✓ Increased agricultural economic output
- ✓ Emissions reduction

Product	cash	deposit	months	Month(Ksh.)	Total
Rainmaker2	103,000	9,999	30	4,300	138,999
Rainmaker2(with Tv)	123,000	11,999	36	4,300	166,799

What's included:

- Submersible pump, Climate Smart Battery
- 310W solar panel, 100M (25MM) HDPE Pipe
- 4 sprinklers necessary fittings, 4 LED Light Bulbs and USB charging ports
- Option: 160W portable panel
- Add-ons: 32" TV and/or Direct Drip Irrigation system (Sold separately)

For Further Information

Visit our Website at <http://cawsacentre.egerton.ac.ke>

Email us on: carp.potato@egerton.ac.ke or akibe@egerton.ac.ke

Call us on: 0721402957 or 0723079623

Author: Eric Kagotho
Email: erickagotho@outlook.com
kibeanto@gmail.com
Mobile: +254718431101
Edited by: Prof. A. M. Kibe

Supported by
RUFORUM through the CARP+ Seed Potato
Value Chain Project

