



UNIVERSITY *of*  
GREENWICH

# CASSAVA PROCESSING TRAINING MANUAL

CASSAVA FUFU

# RAW MATERIAL: CASSAVA ROOTS

## Process

- Harvest mature roots
- Weigh all raw material

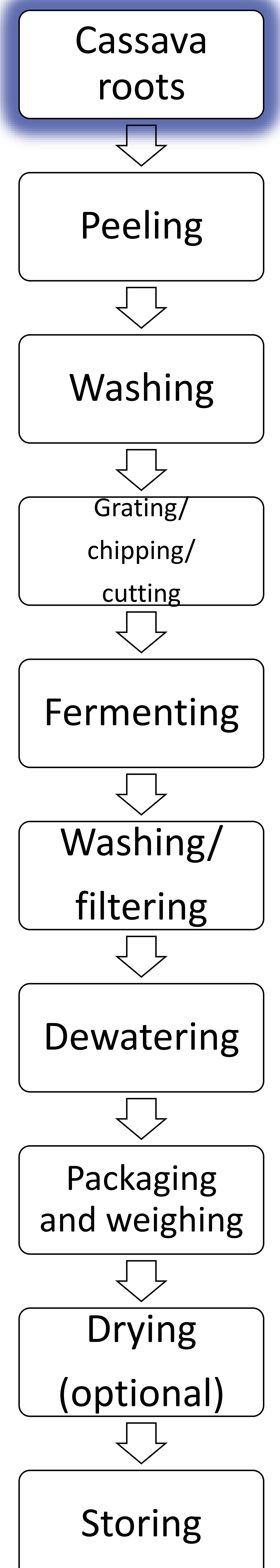
## Equipment

- Sharp implements for harvesting
- Calibrated balance/scales for weighing before and after processing

## Tips

- Avoid immature, old, diseased, fibrous or woody roots
- Avoid damage during harvesting
- Process harvested roots within 24 hours for best quality and maximum recovery of processed products

## Depictions



# PEELING

## Process

- Top and tail, and peel the roots using a sharp knife/peeler
- Remove the outer brown skin and inner thick cream layer
- Remove any diseased or woody parts from the roots
- Place the peeled roots in clean bowls of water or wash tank

## Equipment

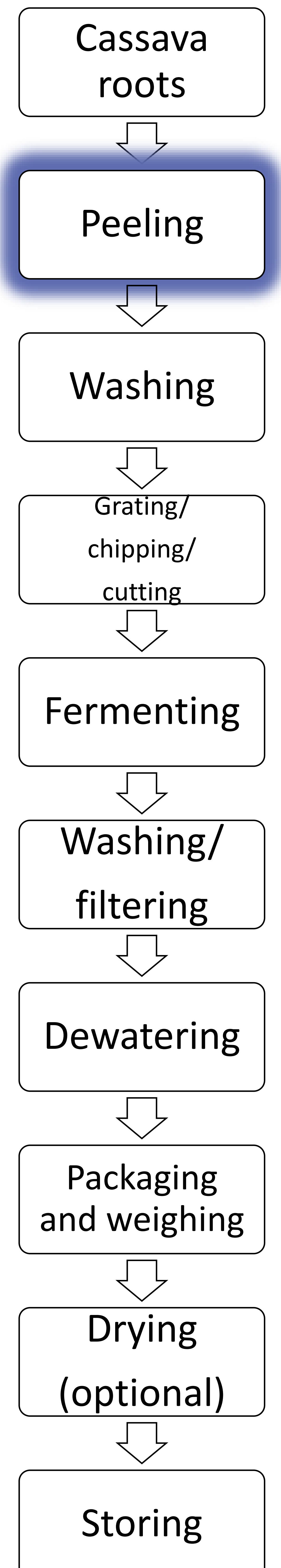
Clean, sharp edge stainless steel knife (sharpen and visually check blades on a regular basis)

- Clean containers or wash tanks/basin

## Tips

- Be careful, do not remove too much peel to avoid too much wastage- weigh all peels and gradeouts
- Grading and peeling can be done at the same time
- Peeled roots should not be left more than an hour in washing water to avoid fermentation

## Depictions



# PEELING: MOTORISED MECHANICAL

## Process

- Top and tail the roots
- Remove any diseased or woody parts from the roots
- Operate peeling machine with batches of topped/tailed roots
- Place peeled roots in clean water
- Manually trim unpeeled areas

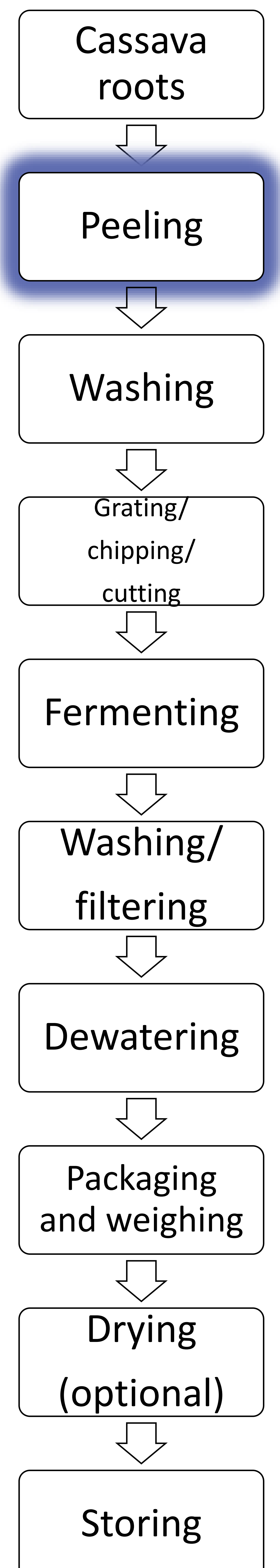
## Equipment

- Clean, sharp edged stainless steel knife
- Clean water source
- Peeling machine
- Collection bowl/tank for roots/waste

## Tips

- The peeling machine should not remove more waste than manual peeling- avoid wastage! Weigh all peels and gradeouts
- Grading prior to peeling - can be done at the same time
- Do not leave peeled roots for more than an hour in washing water to avoid fermentation

## Depictions



# WASHING

## Process

- Manual or semi-automatic
- Place peeled roots in clean water
- Wash roots until all soil is removed, changing the water 2 to 3 times, or until clean
- Transfer clean roots to clean container or clean surface

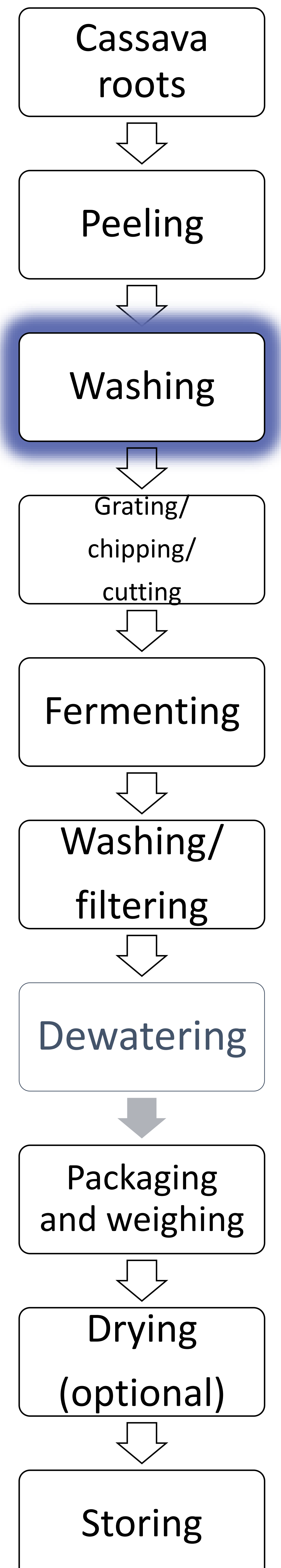
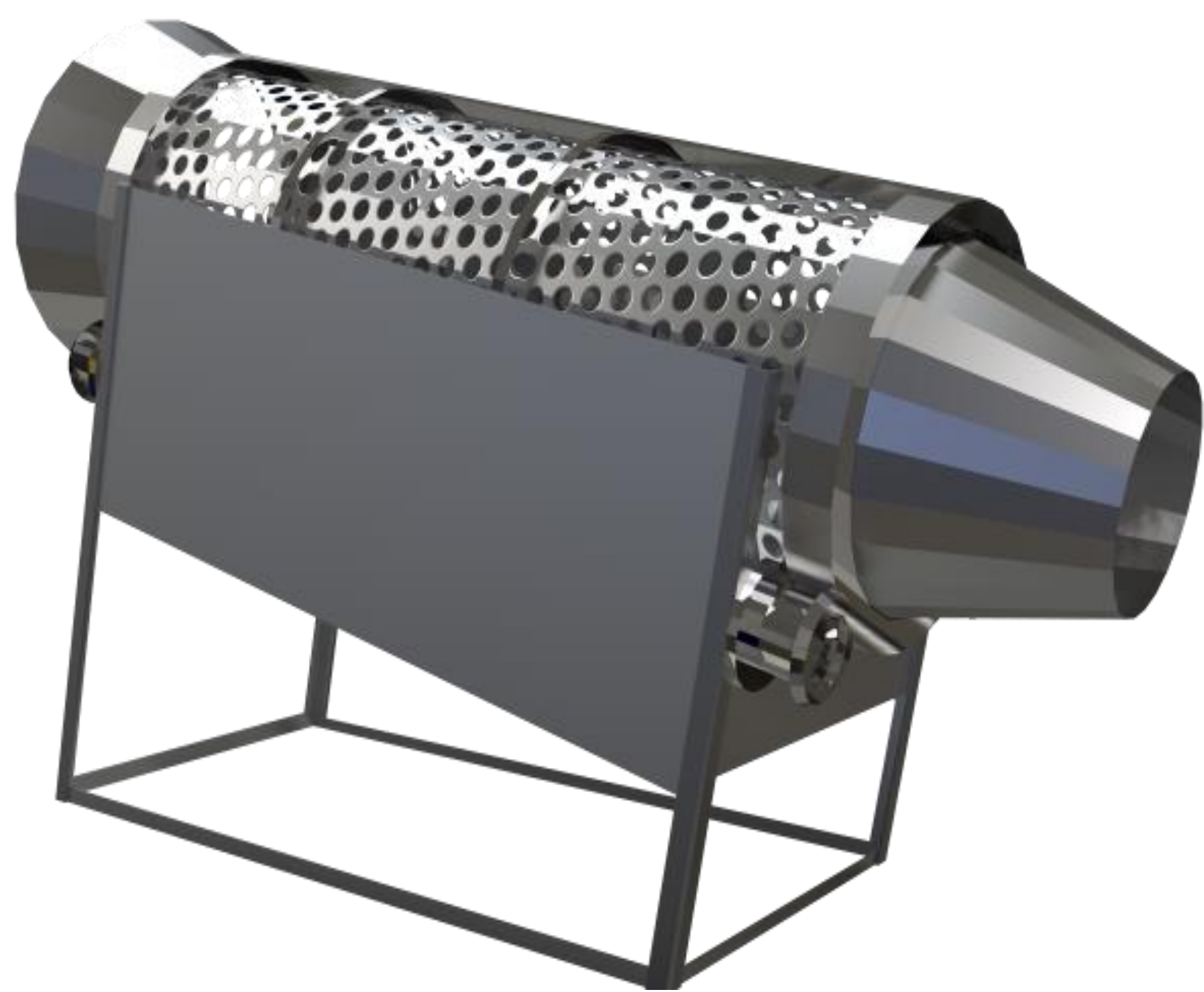
## Equipment

- Clean water source
- Basin, wash tank
- Scrubbing brush (optional)

## Tips

- Do not leave cassava roots in water for more than an hour to avoid fermentation
- Wash roots soon after peeling to avoid discoloration and maximize whiteness of processed product

## Depictions



# CUTTING/CHIPPING/GRATING

## Process

- If using a grater or chipper, run water through it to clear any surface dirt and provide lubrication to the abrasive drum
- Ensure there is a clean collector to discharge the pulp into
- Place washed roots into grater or wet mill until batch is complete

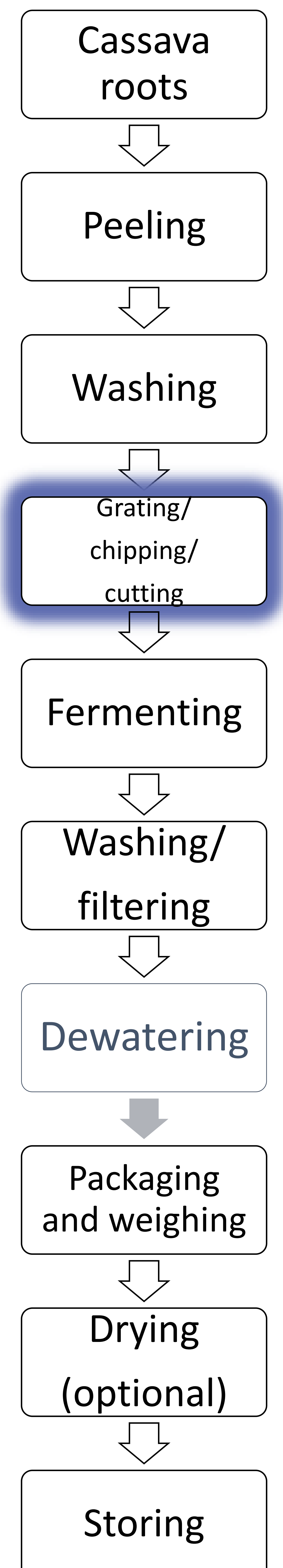
## Equipment

- Grater or wet mill
- Collector or clean basin
- Small bowls for moving pulp

## Tips

- Ensure equipment is maintained or regularly serviced
- Ensure abrasive grinding drum is sharp
- Clean machine after each use and store in hygienic conditions
- Wet milling produces a finer pulp and may improve recovery rates

## Depictions



# WET FERMENTATION

## Process

- Place peeled washed roots in a clean fermentation container
- Add clean water (or previous fermentation water) –sufficient to just cover the fresh roots
- Cover the container with a lid until fermentation is complete (determined through bubbles present on surface/characteristic fermentation aroma/softness of roots)

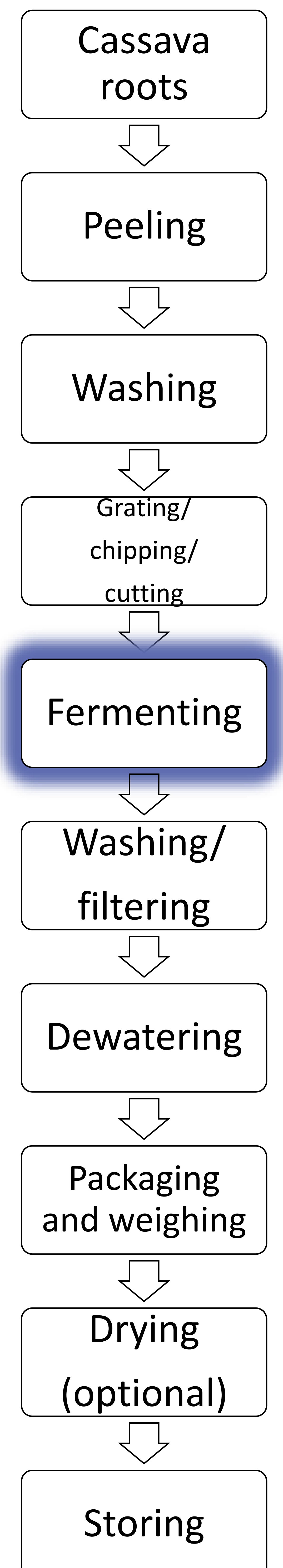
## Equipment/materials

- Stainless steel fermentation tanks or plastic drums
- Clean scoop, bowls/containers
- Clean water
- Fermentation accelerator (optional)

## Tips

- The length of fermentation (3-10 days) will depend on ambient temperature conditions, as well as the desired final pH of the product. Use a pH meter to verify
- Cut the roots for uniformity in achieving fermentation
- Clean all equipment and utensils after each use
- Store both product and equipment in hygienic conditions

## Depictions



# WASHING/FILTERING

## Process

- Use a scoop or bowl and place fermented roots over a sieve and manually crush/rub, using clean water as an aid (optional)
- Periodically remove residual fibre/clumps from sieve, adding more roots to the sieve when required
- Allow filtered product to settle in a container or semi-porous bags
- Once settled, pour off (decant) residual water

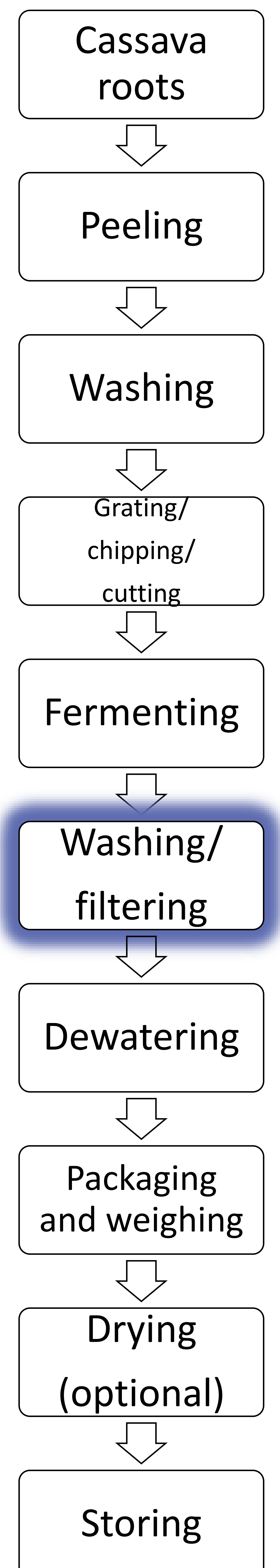
## Equipment

- Clean bowl/containers
- Sieve or mesh (preferably stainless steel where in contact with product)
- Collector or other suitable container
- Dewatering press (optional)

## Tips

- Wash all equipment in clean water after each use and store in hygienic conditions
- Sedimentation and dewatering can take place simultaneously in porous bags

## Depictions





# PRESSING (DEWATERING)

## Process

- Place standard amounts of fufu pulp into clean propylene (or other porous) bags
- Bags can be left on a clean surface until the water stops running out (approx. 2-3 hours)
- If dewatering using a press, place each bag in turn into the press and apply pressure.
- For cage presses, place a wood or metal plate underneath the jack (where used) before jacking and pressing operation
- Allow a fully loaded press 1.5-2 hours to dewater

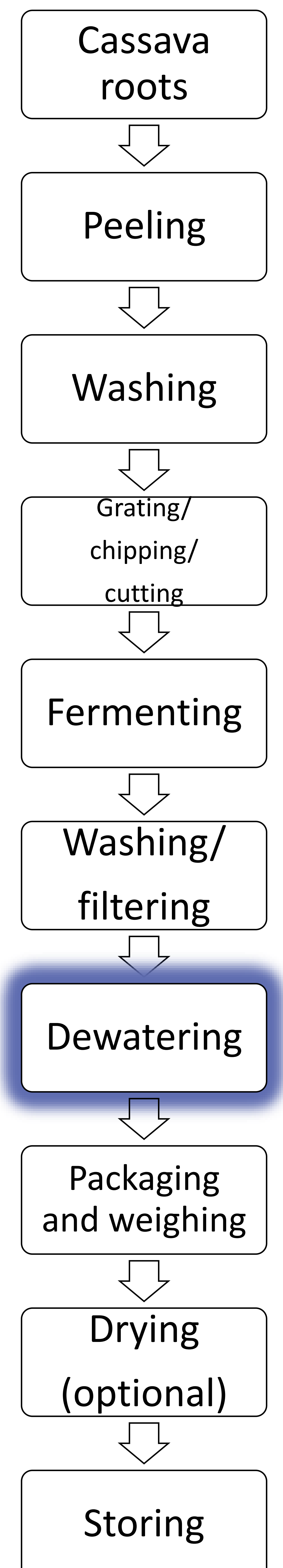
## Equipment

- Press cage and hydraulic jack (30t or 50t), screw press
- Porous pressing bags (e.g. PP sugar bags)

## Tips

- For optimum dewatering, load bags equally with 15Kg maximum of pulp for HQCF
- Flatten bags across the press cage and stack
- Load the corners with wood as the cage is filled
- Ensure jack is operated by trained staff
- Clean press and jack after each use and place in clean store

## Depictions



# PACKAGING

## Process

- Use a standard scoop or bowl and place fufu inside strong bags
- Fill to a standard weight and weigh the bag
- Seal the bag and store off the ground until marketing

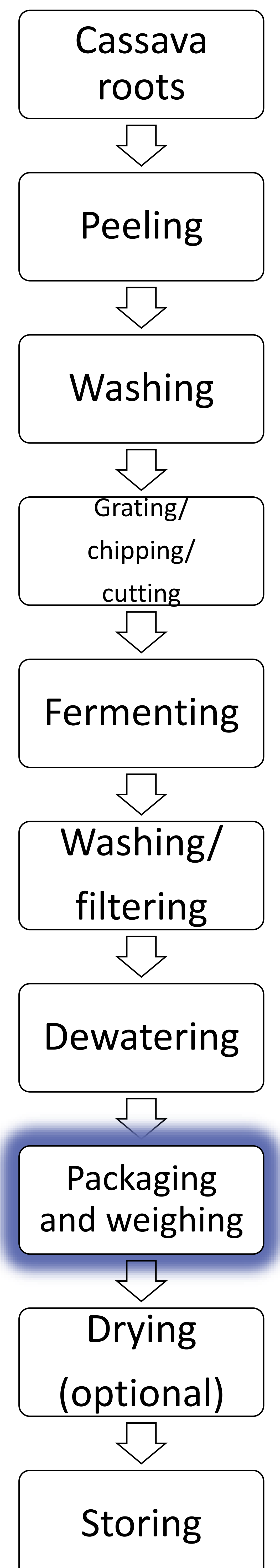
## Equipment

- Clean bowl/containers
- Double lined (or other suitably strong) polypropylene bags
- Tarpaulin
- Pallets

## Tips

- Wash all equipment, including bags in clean water after each use and store in hygienic conditions
- Ensure storage facilities have good drainage
- Durable packaging ensures bags do not burst during subsequent marketing

## Depictions



# STORING

## Process

- Transfer bagged/contained fufu into clean, ventilated stores until further processing or marketing
- Place wet fufu bags on pallets (off the ground)

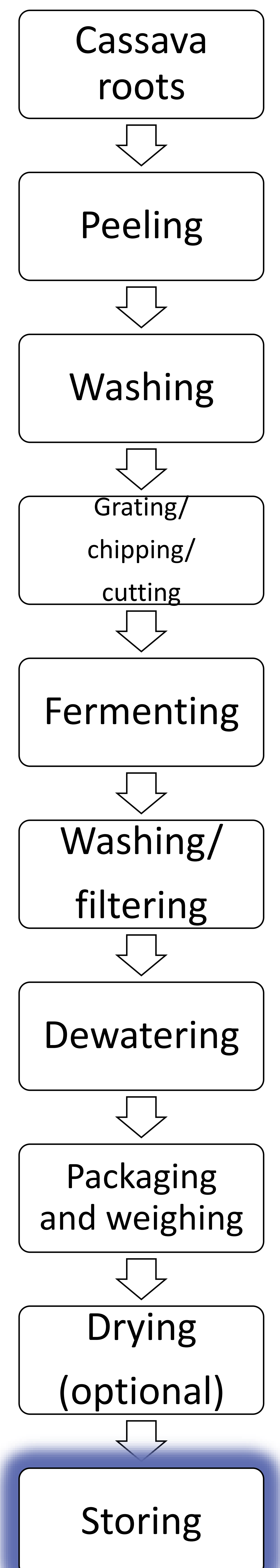
## Equipment

- Tarpaulin
- Pallets

## Tips

- Store packaged wet fufu in hygienic conditions
- Ensure storage facilities have good drainage and ventilation
- Adopt 'First in, First out' rule

## Depictions



# SUN DRYING

## Process

- Place tarpaulin over the drying platform
- Spread product across the tarpaulin (thinly for High Quality Cassava Flour; HQCF). Sifting can take place whilst spreading
- Dry under sun until product is dry to the hand (10-12% moisture content)
- Ensure there is a clean container or bags to load dried product

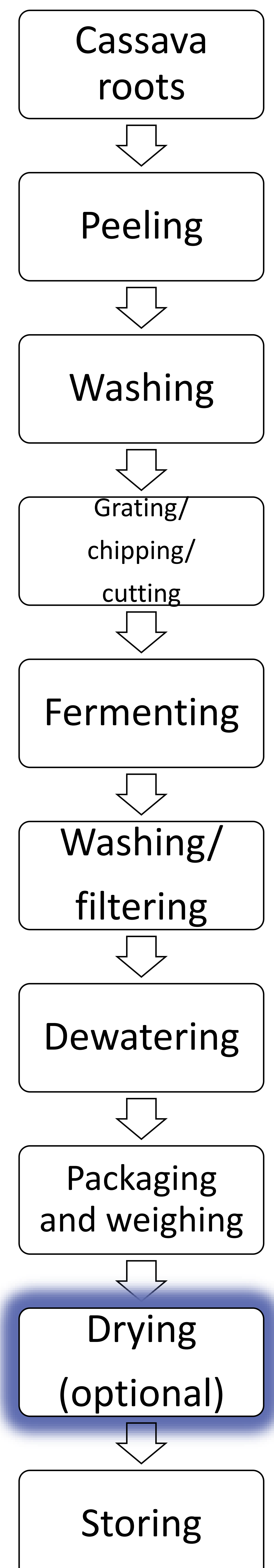
## Equipment

- Raised drying platform
- Black tarpaulin
- Sieve (optional)
- Scoop or bowl for spreading/collecting
- Bags or other container for collecting dried product

## Tips

- For HQCF load cake maximum 5Kg per square meter
- Ensure drying platforms are maintained in good condition
- Periodically treat wooden platform for termites
- Clean tarpaulin regularly and store in clean condition

## Depictions



# SOLAR DRYING

## Process

- Spread product across the drying surface (thinly for High Quality Cassava Flour; HQCF). Sifting can take place whilst spreading
- Dry until product is dry to the hand (10-12% moisture content)
- Ensure there is a clean container or bags to load dried product

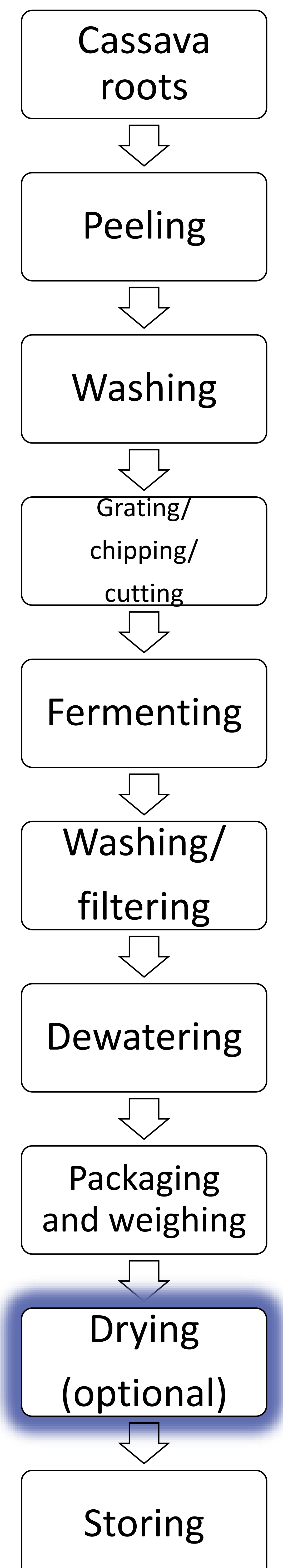
## Equipment

- Drying platform
- Sieve (optional)
- Scoop or bowl for spreading/collecting
- Bags or other container for collecting dried product

## Tips

- For HQCF load cake maximum 5Kg per square meter
- Ensure drying platforms are maintained in good condition
- Clean solar dryer regularly

## Depictions



# ARTIFICIAL (BATCH) DRYING

## Process

Spread product across the drying surface (thinly for High Quality Cassava Flour; HQCF)

- Dry until product is dry to the hand (10-12% moisture content)
- Ensure there is a clean container or bags to load dried product

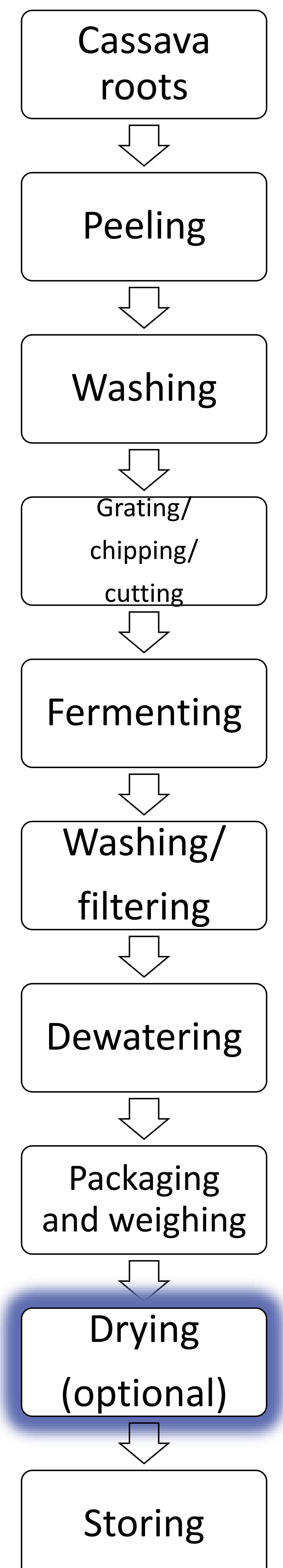
## Equipment

- Tray cabinet dryer or tunnel dryer
- Scoop or bowl for spreading/collecting
- Bags or other container for collecting dried product

## Tips

- For HQCF load cake maximum 5Kg per square meter in tray dryer
- Clean dryer after and before each use

## Depictions



# ARTIFICIAL (CONTINUOUS) DRYING

## Process

### Using the kerosene/diesel burner

- Fill the fuel tank
- Ensure the burner's fuel pump is submerged in the tank
- Switch on the burner from the wall switch
- Switch on the igniter from the knob switch
- Ensure the burner runs for 15-20 minutes
- Turn on the blower for 5 minutes
- Ensure the temperature gauge reaches 130-150°C
- Turn on the feeder (if not manual feeding)
- Resume drying and feed cake at constant rate once reaching correct drying temperature

### Using the agricultural waste based heat exchanger

- Run the screw conveyor and blower to ensure a through way for the waste
- Get the splints of wood to ignite the fire in the heat exchanger
- Feed in the waste into the hopper and run the screw conveyor to fill in the burner inside the heat exchanger
- Wet the splinted wood with petroleum product to enhance a swift burning
- Fire the burner
- Turn on the blower to rekindle and sustain the firing
- Sustain the heat energy generation by fuelling with consistent feeding of waste into the screw conveyor
- Monitor the temperature gauge on the flash dryer
- Resume drying when the temperature gauge reaches 130-150°C

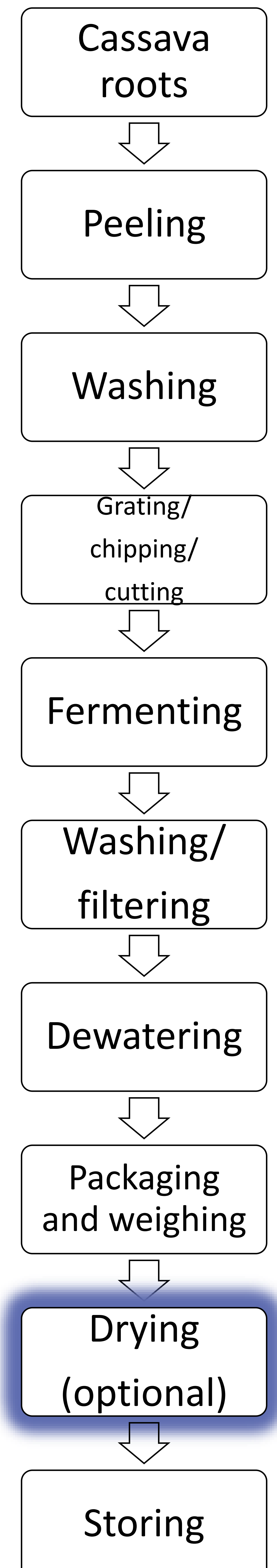
## Equipment

- Flash dryer
- Scoop or bowl for transferring cake
- Bags or other container for collecting dried product

## Tips

- Feed at correct temperature and maintain feed rate to ensure good quality end product
- Locate and ensure you are familiar with operation of the ON/OFF Starter and Stop
- Do not leave equipment on top of the machine
- Check that machine guards are in position
- Check coolant delivery system to allow for sufficient flow of coolant
- Faulty equipment must not be used. Immediately report suspected machinery
- Before making adjustments and measurements or before cleaning swarf accumulations, switch off and bring the machine to a complete standstill
- Allow product to cool to ambient temperature before sealing or milling

## Depictions



## PACKAGING (dried product)

### Process

- Transfer cooled product into clean propylene or other suitable packaging
- Fill bags to a standard weight and weigh
- Label the bags with the production date
- Seal bags prior to storage and/or seal prior to marketing
- Label packaging prior to marketing

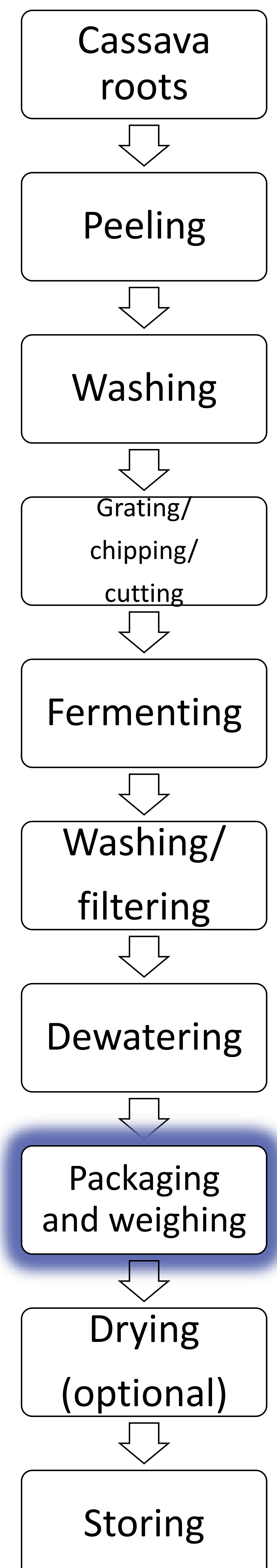
### Equipment

- Bags or other packaging
- Stitching machine (optional) or manual stitching method

### Tips

- Ensure product is checked regularly
- For High Quality Cassava Flour (HQCF), use polyethylene **lined** bags to prevent moisture ingress into the flour
- For correct stock rotation and quality control, bags should be labelled with the processing date

### Depictions





## STORING (dried product)

### Process

- Transfer packages onto pallets
- Transfer bags/packaging to a clean, dry and well-ventilated store until marketing

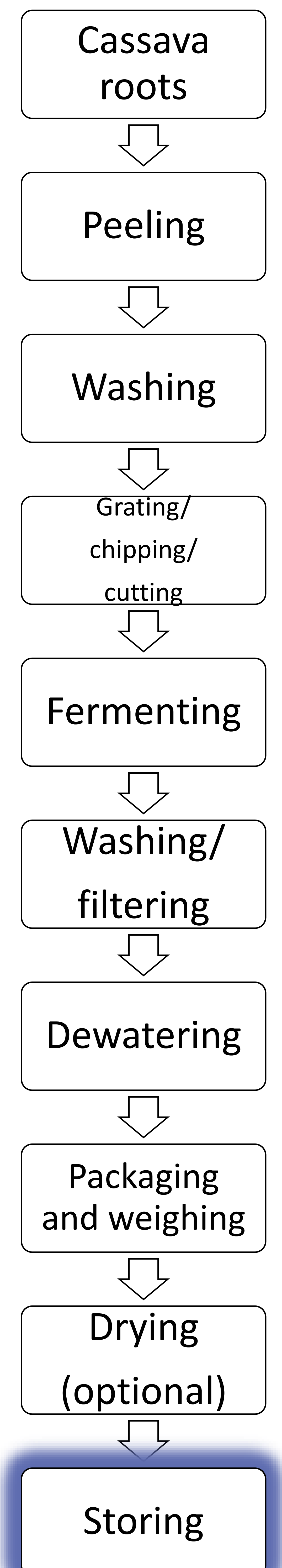
### Equipment

- Pallets
- Store room

### Tips

- Ensure product is checked regularly
- Store bags off the ground using pallets
- Keep perimeter around the bags accessible for inspection
- Follow 'First in, First out' rule

### Depictions



## Acknowledgements

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