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## COLDROOM WITH COOLBOT/ICYUMBA GIKONJESHA GIHENDUTSE GIKORESHA UMURIRO W'AMASHANYARAZI

- Iki cyumba gikonjesha cyubakirwa mu nzu isanzwe. Ku nkuta no ku gisenge ( purafo) homekwaho ibikoresho bituma ubukonje bw' imbere budahindagurika. Icyuma gikonjesha kiyongeraho icyuma kiyifasha kumanura ubushyuhe cyitwa "Coolbot."
- Gukoresha ubu buryo bifasha umuhinzi gushakira umusaruro isoko yitonze kuko uba ubitse ahantu hatuma utangirika
- Umusaruro w'imboga n'imbuto zigisarurwa ubitswe ku bushyuhe bukwiye ushobora kumara igihe kiri hagati y'icyumweru kimwe kugeza ku byumweru 3, ariko ubitswe ku buryo busanzwe ntiwarenda icyumweru kimwe.
- Cold room is a regular house with air conditioner (a/c) unit with a temperature regulator device called a coolbot with a well-insulated wall and ceiling".**
- Use of the technologies will also buy time for the farmers as they look for better market options to negotiate for higher prices".**
- Fresh vegetables and fruits in good condition e.g. Tomato, squash, chili could be obtained in cold room 1 to 3 weeks more shelf life as compared to 1 week of ambient condition".**



\* Degree Celcius

### COST OF COLDROOM WITH COOLBOT (2.9x4x2.5m)/IGICIRO CYO KUBAKA ICYUMBA GIKONJESHA KIKORESHA UMURIRO WAMASHANYARAZI GIHENDUTSE

Nº	Ibikoresho/Items	Ikiguzi/Unit Cost	Ingano/Qty	Ikiguzi Cyose hamwe/ Total cost(Frw)
	Icyumba gisanzwe/Normal room			
1	Coolbot	226,000	1	226,000
2	Icyuma gikonjesha/Air Conditioner 24.000BTU	1,040,000	1	1,040,000
3	Insulation	22,372	66.84	1,495,344
4	PVC Curtain(m2)/rido ya pulasitiki	10,000	14	140,000
5	Itara/Light	25,000	1	25,000
	<b>Igiteranyo, Total</b>			<b>2,926,344</b>



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## Icyumba Gikonjesha Kidakoresheje amashanyarazi/Zero Energy Cooling Chamber( ZECC)

Akamaro ko gukoresha iki cyumba gikonjesha kidakoresha amashanyarazi ni ukubungabunga umwimerere w'umusaruro w'imboga n'imbuto bizigabanyiriza gutakaza amazi n'izindi mpinduka ziterwa n'ubushuhe bwinshi. Ubushuhe bwo muri iki cyumba buba hagati ya dogere serisiyusi 15-18 Imboga rwatsi nk'imbwija zishobora kubikwa muri iki cyumba mu gihe kiri hejuru y'iminsi 5 mu gihe ku bushuhe busanzwe zitangira kwangirika nyuma y'umunis umwe gusa

Zero energy cool chamber is an on-farm rural oriented storage structure which operates on the principle of evaporative cooling.

The major advantage of cool chamber storage is the maintenance of fruit firmness by lowering the physiological loss in weight and other metabolic processes. up to 5 days more shelf life of amarentahus could be obtained in cool chamber storage as compared to ambient condition storage only 1 day.



### IGICIRO K'IBIKORESHO BIKENERWA MU KUBAKA ICYUMBA GIKONJESHA KIDAKOREHA AMASHANYARAZI

NO	Ibikoresho Bikenewe	Ikiguzi	Ingano	Ikiguzi cyose
1	Ama afari ahiye	50	00	0,000
2	Ingorofani 3 zumucanga munini	1,500	3	4,500
3	Umukeka cg Ikkibambano	1,000	1	1,000
4	Akazu k'ibyatsi ko kurinda izuba	1 ,000	1	1 ,000
5	Igiteranyo			,500
6	Amakureti	7,300		,400
7	Igiteranyo cyose			214,400

### INYUNGU KU GISHORO, umusaruro ungana n'ibiro 200

Dushize mububiko ibiro 200kgs by'Urusenda Start with 200 Kg of Chili	Umusaruro wabitswe ahasanze mu gicucu/ Current Practice	Umusaruro wabitwe mucyumba gikonjesha hadakoresheje amashanyarazi / Use of Zecc
	Gushyira umusaruro mu bubiko busanzwe mu bushuve bituma ibihingwa bitakaza amazi n'ubwiza bwabyo	Icyumba gikonjesha amashanyarazi gifasha kugumana ubwiza bwavo
<b>Ibiciro</b> Amatafari ahiye 1,000 kugiciro cya 50 Frw/ 1000 Bricks @ 50 Rw Fr each	Ntakiguzi/ No Cost	50,000
Ingorofani3 z'umucanga munini (1500 frw ku buri ngorofani /3 Weelbarow sands @ 1500 Each	Ntakiguzi/ No Cost	4,500
Umukeka cyangwa ikibambano 1 (1000 Frw)	Ntakiguzi/ No Cost	1,000
Akazu k'ibyatsi ko kurinda izuba zecc/ Shading	Ntakiguzi/ No Cost	10,000
Abakozi bo kubaka/Manpower Amakureti akoresha 10/10 Plastic crates		10,000 73,000 Frw*
<b>INYUNGU cyangwa IGHOMBO</b> Ibiro byagurishwa nyuma y'iminsi 7 hakozwe ijonjora/ Qty to sell after 7 days in Zecc	67kgs**	176kgs**
Igiciro cy'urusenda kwisoko/ Price on Market	800 Frws***	1500 Frws
Umubumbe wamafarnga/ Total Value Market	<b>53,600</b>	<b>264,000</b>
Inyungu mu gukoresha Icyumba gikonjesha/ Profit Ighombo kiboneka mu kudakoresha icyumba gikonjesha hadakoresheje amashanyarazi / ROI		264,000 – 75,500 -73,000= <b>115,500 Frws****</b> <b>115,500 - 53,600=61,900 Frw</b>

\* Amakureti yaguzwe ashobora gukoresha nibura imyaka 5;  
\*\* Umusaruro wabitswe mu buryo busanzwe hatakaye ijanisha rya 70, kugihе umusaruro wabitswe muri zecc watakaye kw'ijanisha rya 12 mu mins 7;  
\*\*\* Urusenda rwari rutukuye cyane kandi rwatangiye kunamba  
\*\*\*\* Ikoreshwa ry'icyumba gikonjesha hatakoresheje amashanyarazi cy'ongerera inyungu ya 115,500 Frws hakurikijwe inyigo yakozwe.





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## EFFECT OF ZERO ENERGY COOLING CHAMBER AND SHADE ON THE STORAGE QUALITY AND SHELF LIFE OF FRESH GREEN AMARANTH

### INTRODUCTION

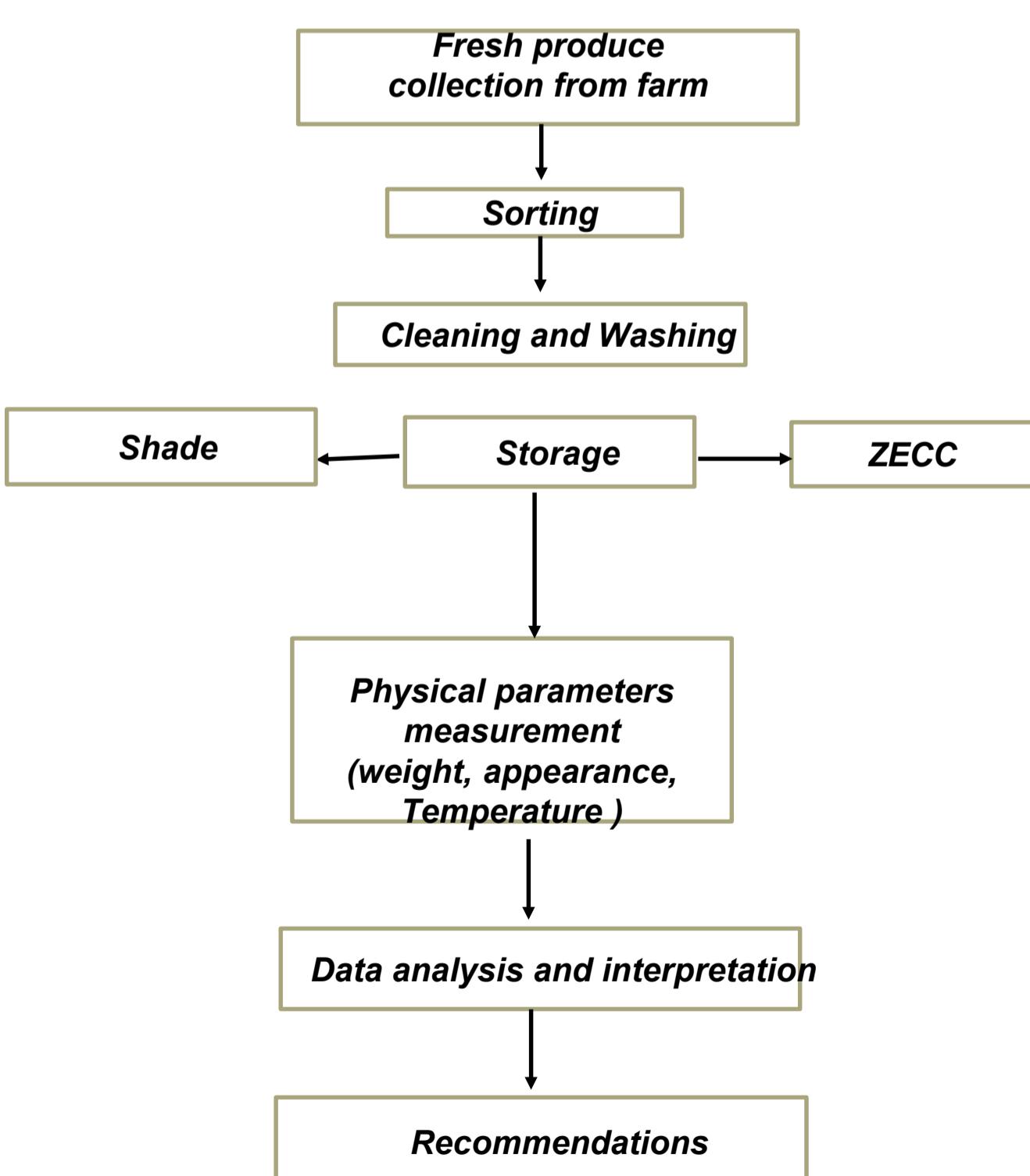
Amaranths are green vegetables that are widely cultivated in Rwanda. Since Amaranths are easily cultivated and sometimes grow by wind dispersion, it is traditionally common in Rwanda where every home has the plant and enjoys its nutrition value which is known to very good according to different literature; It is known as a source of Protein, Vitamin A, Vitamin C, Riboflavin, Vitamin B6, Folate, Calcium, Iron, Magnesium, Phosphorus, Potassium, Zinc, Copper and Manganese.. Currently farmers are cultivating them in a modern way and sold in markets like any other vegetables. Being marketable only when fresh the produce encounter high postharvest losses at both farm and market.

Objective: To compare different storage conditions and their effect on the shelf life of fresh Amaranth

### MATERIALS AND METHOD

Fresh Amaranths samples were harvested in Mulindi field, and transported well in crates to the sorting place at Mulindi PTSC. The samples were cleaned to remove soil and dust with tap water, sorted to remove damaged leaves and trimming was done where necessary to fit in the plastic crates.

The samples were weighed and put under two storage conditions namely Zero Energy cooling chamber and in a shade. The physical parameters were observed and recorded daily for 5 days.



### RESULTS AND DISCUSSIONS

DAYS	IN SHADE	IN ZECC
1		
5		

Physical Appearance: Amaranths in ZECC were fresh and the leaves maintained freshness, color and texture where as those in shade shriveled, withered and the leaves darkened, with some rots and easily dropped off.

STORAGE CONDITIONS							
SHADE at ambient temperature				ZECC			
DAYS	Average Temp in (Celcius)	Amount in Kg	Loss in Kgs	Average Temp in (Celcius)	Amount in Kg	Loss in Kgs	
Day 1	26	2.15	0	20.5	2.15	0	
Day 2	27.4	1.9	11.6	20	2.14	0.22	
Day 3	22.3	1.55	18.4	19.9	2.12	1.14	
Day 4	22.5	1.5	3.22	18.2	2.07	2.32	
Day 5	24.7	1.35	6.66	19.3	1.99	3.57	
Total loss %			39.88			7.25	

After 5 days of storage, the total % loss was 39.88% and 7.25% for amaranths at ambient temperature and ZECC conditions respectively.

RECOMMENDATIONS: Zero Energy Cooling Chamber showed good storage conditions for fresh amaranths we recommend its use for Amaranths farmers to store their harvest at farm and at vegetable markets as they wait for buyers in their communities.





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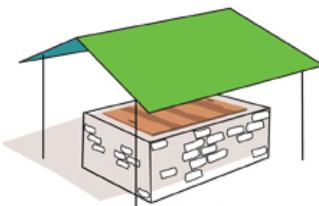
## KUBAKA ZECC N'UBURYO IKORESHWA

### Aho yubakwa

- Guhitamo ahantu heza uhariganize ukoreshheje rato
- Yubakwa ahantu hatwikiriye cyangwa munsi y'igicucu cy'igit
- Yubakwa ahantu ushobora kubona amazi kuburyo bworoshye

### kubaka

- Sanza umucanga uringaniza kugirango akumba katazahrima, wusanze ukora urukiramende
- Gusasa amatafari atwitse, hejuru y'ubo mucanga ahantu hareshya (165\*115 cm)
- Kuzamura inkuta 2 zireshya na 70 cm zitandukanyijwe na 7.5 cm ukuzuzamo umucanga
- Igipfundikizo kidahenze ni ikibambano cyangwa umusambi
- Kubaka akazu ko kurinda izuba



### Uburyo ikoreshwa

- Umucanga, amatafari n'igipfundikizo bigomba guhora bitose
- Ushyiraho amazi mugitondo na nimugoroba
- Imboga cyangwa imboga ubitse muri ZECC uzishyira mu bikoresho bya pulasitiki kandi bifite ubuhumekero (ikureti)
- Mugutosa ibi byose wirinda ko amazi agwa imbere mu makureti kugirango hatazamo indwara z'uduhumyo
- Guhora ukora isuku muri zecc
- Iyo ntacyo ZECC iri gukoreshwa uyitera imiti ituma hatazamo indwara



### Igihe imboga n'imbuto bishobora kumara muri ZECC

No	IBIRIBWA	Igihe bimaramo (iminsi)
1	Imboga z'amababi (amashu, dodo)	3 -10
2	Izindi mboga (inyanya, powavuro,	5-12
3	Ibinyabijumba (ibirayi, ibijumba)	97
4	Imbuto (imyembe)	10
5	Imbuto (Orange)	50-60



<https://image.slidesharecdn.com/zero-energycoolchamber-171014025831/95/zero-energy-cool-chamber-3-638.jpg?cb=1507950027> <http://www.kvkcard.org/files/gallery/Jackfruit.jpg> <https://kvkкар.gov.in/API/Content/Uploads/e39dc8cd-af6f-46d4-aa21-1c84e879a961/48bde71b-1a7c-48df-bf3b-f42d9aa4fd08c.jpg>



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