2016

AGRICULTURAL EXTENSION

FIELD DIARY

Ministry of Agriculture, Irrigation and Water Development

MALAWI

MAP OF MALAWI SHOWING DISTRICTS

2016

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FIELD DIARY

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MALAWI

This Agriculture Diary was produced in collaboration with Michigan State University and Department of Agriculture Extension Service, Malawi as part of the United States Agency for International Development (USAID) project "Modernizing Extension and Advisory Services" (MEAS, www.meas-extension.org).

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MICHIGAN STATE UNIVERSITY

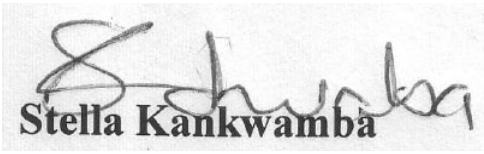
USAID FROM THE AMERICAN PEOPLE

Foreword

It is widely acknowledged that agricultural extension workers play a critical role in agricultural development. Apart from ensuring that farmers have access to various technologies on various crop and livestock enterprises for sustainable productivity, they also play a key role as sources of information in the communities they work in. In order to be effective in their mandate, agricultural extension workers need to be able to plan their work effectively. This diary has been developed to help the frontline extension worker effectively plan and implement extension activities. The diary provides an opportunity for the extension worker to develop work plans for carrying out specific extension activities based on the Malawi's agricultural calendar.

The diary has been developed through a collaborative work between the Department of Agricultural Extension Services and Michigan State University's Department of Community Sustainability. The following people from the department are immensely acknowledged for their efforts in putting up this diary: Mr. Boaz Mandula, Mr. Benjamin Chisama, Mrs. Upile Muhariwa, Ms. Cynthia Mahata, Mr. Matsimbe Nkambeni, Mrs. F. Masambuka-Kantchewa, Mr. Noel Limbani and Mr. Hamilton Chimala.

We also appreciate the leadership of Dr. Murari Suvedi, Professor in the Department of Community Sustainability at Michigan State University, USA to initiate this pilot publication for Malawi. We are grateful to Michigan State University and USAID/Modernizing Extension and Advisory Services project for supporting this publication.



Director of Agricultural Extension Services
Ministry of Agriculture, Irrigation and Water Development

About the Malawi Department of Agricultural Extension Services

The department of agricultural extension services is one of the constituent departments in the Ministry of Agriculture Irrigation and Water Development in Malawi. The department is mandated to provide holistic and demand-driven agricultural extension services

Our Vision
All farmers demand and access high quality agricultural extension services.

Our Mission
To provide demand-driven agricultural extension services in partnership with civil society organizations, non-governmental organizations, private sector and farmer organizations; and promote equalization and coordination in service provision at all levels in order to achieve food, nutrition and income security at the household level.

National Goal
The goal of the agricultural extension program is to assist farmers in achieving and maintaining self-sufficiency in food production and income generation through promotion of technologies proven to improve productivity. Extension puts emphasis on assisting farmers to become aware of improved technologies in all crop and livestock enterprises. Farmers are encouraged to demand extension and advisory services to meet their needs.

Key Features of the Malawi Agricultural Extension Policy
Pluralistic extension service
This ensures that several players, such as public/government, NGOs and private companies take part in the provision of extension services in a country. This gives farmers a greater choice of quality services and enable them to develop new skills for a market-oriented economy.

Demand-driven extension services
Extension services need to respond to farmer demands with consideration to their resource endowment. Extension service providers need to dialogue with farmers to support them with appropriate services so as to enhance learning.

Accountability
This requires that farmers are not looked upon only as beneficiaries of extension but also as clients, sponsors and stakeholders. This calls for mechanisms for great accountability of extension services to farmers and their representatives to bring high quality services. Where extension is by private providers, farmers must be given a chance to choose among extension deliverers, especially when the farmers are the ones paying for the services. For public extension services, farmers should have a voice in the way extension services are planned and implemented.

Those who benefit, pay (service at cost)
This recognizes that it is economically impossible for government to provide all extension services. Where possible, farmers and other private sector players must also provide resources to support for extension services.

Equalization
While encouraging private sector involvement in extension service delivery, the public sector must make sure that marginalized and vulnerable segments of the society such as women, youths and people with disabilities are not left out of the development process.

Malawi Distances

	Lilongwe	Balaka	Blantyre	Chikwawa	Chitipa	Dedza	Dowa	Karonga	Kasungu	Machinga	Mangochi	Mchinji	MonkeyBay	Mulanje	Mwanza	Mzimba	Mzuzu	NkhataBay
Balaka	201	0																
Blantyre	311	127	0															
Chikwawa	359	175	54	0														
Chitipa	691	889	1000	1047	0													
Dedza	84	118	229	276	772	0												
Dowa	53	254	365	412	669	137	0											
Karonga	590	788	899	946	101	671	568	0										
Kasungu	127	328	439	489	564	211	107	463	0									
Machinga	250	49	100	154	938	167	33	837	377	0								
Mangochi	245	97	191	254	843	159	237	742	344	91	0							
Mchinji	109	310	421	468	699	193	158	598	138	359	408	0						
MonkeyBay	206	160	253	307	804	120	198	703	305	153	63	312	0					
Mulanje	378	194	66	120	1066	295	431	968	505	161	251	487	314	0				
Mwanza	300	116	104	151	986	218	354	828	428	165	214	410	276	170	0			
Mzimba	278	476	587	634	425	359	256	324	151	525	574	286	455	653	576	0		
Mzuzu	367	565	676	723	327	448	345	226	240	614	516	375	477	742	665	117	0	
NkhataBay	413	465	576	623	374	494	391	273	286	514	479	421	440	642	565	154	47	0
Nkhotakota	200	267	378	425	562	235	142	461	127	316	281	304	242	444	367	353	235	198
Nsanje	488	304	183	135	1176	405	541	1015	615	282	373	597	436	249	279	763	852	752
Ntcheu	158	43	154	201	847	75	211	746	284	92	141	267	155	220	143	434	523	470
Ntchisi	90	291	402	449	648	174	53	547	85	340	290	194	251	468	391	535	324	370
Rumphi	432	630	741	788	276	513	410	176	305	728	584	440	545	807	730	170	68	115
Salima	103	158	269	316	673	126	67	572	173	207	172	207	133	335	258	464	346	309
Thyolo	358	176	47	101	1046	275	411	885	485	141	231	467	294	47	150	633	722	622
Zomba	286	85	64	118	974	203	339	815	413	36	127	395	189	125	168	561	650	550

Personal Information

Name: ……..
Contact Address: ……
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Telephone (home): …… Telephone (work): ……
Cell: …… Fax: ……
Email: …… Skype: ……

Duty Station

ADD:…… District: ……
Name of EPA: …… Name of Section: ……
Designation: ……..

Roles and responsibilities:

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Special Projects Implementation:

Name of project: ……
Thematic area: ……
Project sites: ……
Duration: …… Targeted farmers: ……
Project status: ……

Name of project: ……
Thematic area : ……
Project sites: ……
Duration: …… Targeted farmers: ……
Project status: ……

Important Agricultural Statistics

1. Position Latitude Longitude: 1330 S 3400 E
2. Total Area: 118, 484 sq km
3. Land-Use
    - Agricultural Land 59.2%
    - Arable Land 38.2%
    - Permanent crops 1.4%
    - Permanent pasture 19.6%
    - Forest 34%
    - Irrigated area: 735 sq km
4. Water area: 24,404 sq Km
5. GDP contribution by sector
    - Agriculture: 30.1%
    - Industry: 18.5%
    - Services: 51.3%
6. Population: 17, 964, 697
7. Population density: 139 people per sq km
8. Population growth Rate: 3.32%
    - Birth rate: 41.56 births per thousand
    - Death rate: 8.41 deaths per thousand

National crop production figures for the past 3 years (metric tons)

	2012		2013		2014	
CROP	HECT	PROD	HECT	PROD	HECT	PROD
MAIZE	1,357,575	2,646,618	1,676,758	3,639,866	1,704,528	3,978,123
RICE	59,420	110,135	65,275	125,156	67,400	132,002
GROUNDNUTS	230,421	219,182	362,824	380,800	375,991	397,503
TOBACCO	43,142	45,701,838	120,172	132,849,214	132,738	154,946,681
COTTON	243,359	196,557	184,513	158,826	149,259	132,337
BEANS	233,808	136,397	307,158	189,417	316,686	195,048
PIGEON PEAS	203,009	254,434	217,068	287,983	223,207	318,885
COW PEAS	63,739	26,338	75,504	36,119	78,472	38,445
FIELD PEAS	4,642	3,059	4,473	3,118	4,596	3,139
GRAMS	1,828	1,074	1,849	1,193	1,806	1,161
SOYA BEANS	53,946	48,335	114,369	116,977	121,913	132,185
DOLICHUS BEANS	5,005	2,972	5,005	3,292	4,702	3,226
VELVET BEANS	10,093	9,552	10,699	11,647	10,353	12,832
GROUND BEANS	10,153	6,108	12,953	8,939	13,249	9,322
CHICK PEAS	2,259	1,779	2,390	1,970	2,295	1,920
CASSAVA	183,085	4,047,316	211,089	4,813,699	216,405	5,102,692
S.POTATOES	169,780	2,849,544	212,940	3,846,930	224,259	4,209,699

CONTACTS FOR KEY AGRICULTURAL OFFICES

Office	Address and contacts
Karonga ADD	Private Bag 4 Karonga Program Manager: Mr B Phewa Tel: 0888850200
Mzuzu ADD	Private Bag 131, Mzuzu. Program Manager: Mrs A. Moyo Tel: 0888364375/0999364375
Kasungu ADD	P.O. Box 28 Kasungu Program Manager: Mr M Bodzalekani Tel: 0888531925/0999939838
Salima ADD	Private Bag 1, Salima Tel: 0888515009 Program Manager: Mr A Benati
Lilongwe ADD	P.O. Box 379, Lilongwe Program Manager: Dr M Theu Tel: 0888302908
Blantyre ADD	P.O. Box 379, Blantyre Program Manager: Mr M Kausi Tel: 0881433824
Machinga ADD	Private Bag 3 Liwonde Program Manager: Mrs G K. Thaulo Tel: 0888873931/0999209498
Shire Valley ADD	Private Bag 1 Ngabu Program Manager: Dr Jerome Nkhoma Tel: 0881692331

Chitedze Research Station	P.O. Boxc 158, Lilongwe Tel.: (265) 01 707 222/224
Bvumbwe Rsearch Station	P.O. Box 5748, Limbe. Tel: (265) 01 916 427/428
Lunyangwa Research Station	P.O. Box 59, Mzuzu Tel.: (265) 01 332 687/961
Kasinthula Experimental Station	P.O. Box 28, Chikhwawa Tel.: (265) 01 420 207/203
Makoka Experimental Station	P/Bag 3, Thondwe, Zomba Tel.: (265) 01 534 254
Lifuwu Experimental Station	P.O. Box 102, Salima Tel.:(265) 01 8573 857
Mkondezi Experimental Station	P.O. Box 133, Nkhata Bay Tel.: (265) 01 353 317/227
Baka Experiment Sub-Station	P.O. Box 97, Karonga Tel.: (265) 01 362 235
Mbawa Experiment Sub-Station	P.O. Box 8, Embangweni, Mzimba Tel.: (265) 01 348 705
Agricultural Communication Branch	P.O. Box 594, Lilongwe. Tel: 01 750 384

Agricultural Development Divisions, EPAs and Number of Extension workers

Agricultural Development Division	District	No. of EPAs	No. of Sections	No. of Farm Families	No. of Extension Workers
Karonga	Karonga	6	53	71813	37
	Chitipa	6	51	64719	27
	KRADD TOTAL	12	104	136532	64
Mzuzu ADD	Rumphi	7	53	47,701	37
	Mzimba Central	13	100	177787	63
	Mzimba North	9	65	106023	54
	Nkhata-Bay	9	53	52,389	44
	Likoma	2	2	2,454	2
	MZUZU ADD TOTAL	40	273	386354	200
Kasungu ADD	Ntchisi	4	70	67,617	33
	Dowa	9	127	175,425	74
	Mchinji	6	90	187,833	64
	Kasungu	8	105	211,801	64
	KADD TOTAL	27	392	642,676	235
Salima ADD	Salima	7	80	102336	52
	Nkhota-Kota	7	77	90,577	50
	SLADD TOTAL	14	157	192913	102
Lilongwe ADD	Ntcheu	7	107	159,349	59
	Dedza	10	169	197,492	100
	Lilongwe	19	314	430,673	273
	LADD TOTAL	36	590	787514	432
Machinga ADD	Balaka	6	83	125,444	54
	Machinga	8	140	209,615	54
	Mangochi	11	187	267,754	93
	Zomba	9	162	238,072	90
	MADD TOTAL	34	572	840,885	291
Blantyre ADD	Mwanza	2	24	30,249	21
	Neno	2	37	36,342	22
	Blantyre	5	83	189,937	66
	Chiradzulu	3	62	106,157	42
	Thyolo	6	143	195,461	69
	Mulanje	5	57	202,463	48
	Phalombe	6	70	102,793	40
	BLADD TOTAL	29	476	863,402	308
Shire Valley ADD	Chikwawa	6	124	107,021	55
	Nsanje	5	58	60,790	33
	SVADD TOTAL	11	182	167,811	88
NATIONAL TOTAL		**203**	**2746**	**4018087**	**1720**

Malawi Events and Holidays

New Years Day	1st January
John Chilembwe's day	15th January
Martas Day	3rd March
Good Friday	25th March
Labour day	1st April
Kamuzu Day	14th May
Independence day	6th July
World Food Day	17th October
World Aids Day	1st December
Chrismas Day	25th December

Important Contact Numbers:

Name:	
Telephone:	
Email:	

Name:	
Telephone:	
Email:	

Name:	
Telephone:	
Email:	

2016 Calendar

January

S	M	T	W	T	F	S
31					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	28	30

February

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

March

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

April

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	28	30

May

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

June

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

July

S	M	T	W	T	F	S
31					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	28	30

August

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

September

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	28	30	

October

S	M	T	W	T	F	S
30	31					1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

November

S	M	T	W	T	F	S
31		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

December

S	M	T	W	T	F	S
31				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	28	30	31

2016 Year Planner

	January	February	March	April	May	June
Sun					01	
Mon		01			02	
Tues		02	01		03	
Wed		03	02		04	01
Thrus		04	03		05	02
Fri	01	05	04	01	06	03
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Sun	03	07	06	03	08	05
Mon	04	08	07	04	09	06
Tues	05	09	08	05	10	07
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Fri	22	26	25	22	27	24
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Mon	25	29	28	25	30	27
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Sat	30			30		
Sun	31					
Mon						

2016 Year Planner

July	August	September	October	November	December	
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23	27	24	22	26	24	Sat
24	28	25	23	27	25	Sun
25	29	26	24	28	26	Mon
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JANUARY

SUGGESTED ACTIVITIES THIS MONTH

Crop/Commodity	Karonga ADD and Mzuzu ADD	Kasungu Lilongwe and Salima ADD	Blantyre, Machinga and Shire Valley ADD
Maize	Planting Apply basal fertilizer Weeding Supplying in poorly germinated plots	Applying top dressing fertilizer Weeding	Banking
Rice	Transplant seedlings Apply first fertilizer	Transplanting Fertilizer application	Sowing Transplanting Weeding Fertilizer application Marketing dry season crop
Sorghum	Weeding	Weeding	Weeding Bird scaring
Pulses (soya beans, beans, cow peas, green grams)	Planting Weeding	Weeding	Banking
Groundnuts	Weeding	Weeding	Hand weeding Banking
Roots and tubers	Planting Weeding Harvesting cassava	Planting Weeding Controlling pests and diseases in potatoes	Harvesting cassava and potatoes grown in dimbas Weeding
Tomato	Pest and disease control Weeding Staking	Transplanting new plants Fertilizer application Harvesting Marketing	Spraying Weeding Harvesting
Cotton	Weeding Scouting Spraying	Scouting Spraying Weeding	Weeding Scouting Spraying
Land resource conservation	Planting vertiver Gully control Planting agroforestry trees Under sowing tephrosia	Planting vertiver Gully control Pruning hedgerows Planting agroforestry trees Under sowing tephrosia	Planting vertiver in nurseries Constructing check dams Planting vertiver Transplanting agroforestry trees Undersowing tephrosia Planting trees along boundaries
Livestock management	Establishing nursery for fodder trees and shrubs Controlling mastitis Dipping Disease surveillance Meat inspection	Controlling mastitis Dipping Disease surveillance Meat inspection	Strategic dipping Disease surveillance Meat inspection

ACTIVITY PLAN

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ACTIVITY PLAN

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REVIEW NOTES FOR JANUARY

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SUGGESTED ACTIVITIES THIS MONTH

Crop/commodity	**Karonga and Mzuzu**	**Kasungu, Lilongwe and Salima**	**Blantyre, Machinga and Shire Valley**
Maize	Weeding Top dressing fertilizer Banking	Banking Controlling stalk borers and other pests	Construct storage facilities in readiness for harvesting
Rice	Weeding Second fertilizer application	Weeding Fertilizer application	Transplanting Fertilizer application Weeding
Sorghum	Weeding	Weeding	Bird scaring Weeding
Pulses (soya beans, beans, cow peas, green grams)	Weeding	Banking	Prepare land for relay crops Planting relay crop
Groundnuts	Banking	Hand weeding	Hand weeding Lifting Marketing
Roots and tubers (cassava and potato)	Weeding	Weeding Harvesting potatoes	Weeding
Tomato	Pest and disease control Weeding Nursery preparation for dry season planting	Harvesting Marketing Sowing new plants Weeding	Harvesting Nursery preparation
Cotton	Weeding Scouting	Scouting Spraying	Scouting Spraying
Land resource conservation	Planting vertiver Planting trees along boundaries Gully control Under sowing tephrosia	Under sowing tephrosia Gully control	Constructing check dams Maintaining marker ridges Gully control Planting vertiver Boundary tree planting Compost making
Livestock management	Controlling mastitis Dipping Disease surveillance Meat inspection	Making silage and hay Dipping Disease surveillance Meat inspection	Making silage and hay Mastitis control

ACTIVITY PLAN

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SUGGESTED ACTIVITIES THIS MONTH

Crop/commodity	Karonga and Mzuzu	Kasungu, Lilongwe and Salima	Blantyre, Machinga and Shire Valley
Maize	Banking		Construct storage facilities Harvesting Purchasing pesticide for storage
Rice	Weeding	Bird scaring	Weeding Fertilizer application Bird scaring
Sorghum	Wedding		Harvesting Purchasing storage for pesticides
Pulses (soya beans, beans, cow peas, green grams)	Harvesting first crop Planting second crop	Weeding second crop	Planting beans Weeding beans Marketing Harvesting first crop
Groundnuts	Hand weeding	Lifting drying	Marketing Lifting Drying
Roots and tubers (cassava and potato)	Harvesting potatoes Storage of sweet potatoes Marketing sweet potatoes	Weeding Harvesting potatoes	Harvesting Nursery preparation
Cotton	Scouting Spraying	Scouting Spraying	Scouting Spraying
Land resource conservation	Managing trees	Compost making Managing tree species	Conduct conservation campaigns Managing tree species Compost making
Livestock management	Making hay and silage Strategic dipping Disease surveillance Meat inspection	Making hay and silage Meat inspection Vaccination against ECF Disease surveillance	Stall feeding Vaccination against rabies Strategic dipping Disease surveillance Meat inspection

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SUGGESTED ACTIVITIES THIS MONTH

Crop/commodity	**Karonga and Mzuzu**	**Kasungu, Lilongwe and Salima**	**Blantyre, Machinga and Shire Valley**
Maize	Construction of storage facilities Harvesting Stocking	Construct storage facilities Harvesting Stocking Seed selection Storage	Harvesting Constructing storage facilities Planting for winter
Rice	Garden preparation Bird scaring Weeding	Bird scaring	Bird scaring
Sorghum	Harvesting Grain storage	Bird scaring	Harvesting
Pulses (soya beans, beans, cow peas, green grams)	Harvesting first crop Planting second crop	Harvesting	Harvesting forest crop
Groundnuts	Hand weeding	Lifting Drying	Lifting and drying Shelling Grading Seed selection and storage
Roots and tubers (cassava and potato)	Harvesting sweet potatoes Storage sweet potatoes Marketing sweet potatoes	Nursery preparation for potatoes Planting potatoes in dimbas Harvesting sweet potatoes	Harvesting sweet potatoes Dimba planting for sweet potatoes
Cotton	Scouting Spraying	Picking Drying Storage	Picking Grading Marketing Storage Spraying
Land resource conservation	Maintaining marker ridges Group formation for catchment protection	Maintenance of marker ridges Compost making	Incorporating crop residues Conducting conservation campaigns Compost making Stream bank and catchment conservation Making firebreaks Fencing agroforestry trees
Livestock management	Silage and hay making Mastitis control Strategic dipping Vaccinating against NCD Disease surveillance Meat inspection	Stall feeding Deworming Vaccinating against NCD Meat inspection Disease surveillance Strategic dipping	Stall feeding Deworming Newcastle disease vaccination Disease surveillance Meat inspection

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REVIEW NOTES FOR APRIL

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SUGGESTED ACTIVITIES THIS MONTH

Crop/commodity	**Karonga and Mzuzu**	**Kasungu, Lilongwe and Salima**	**Blantyre, Machinga and Shire Valley**
Maize	Constructing storage facilities Harvesting and stocking Storage	Harvesting Storage Purchasing insecticides for storage Garden preparation Planting dry season	Garden preparation Planting
Rice	Planting for winter Fertilizer application Weeding Bird scaring	Harvesting drying marketing Garden preparation Purchasing inputs Grading	Harvesting Grading
Sorghum	Grain storage	Harvesting	Land clearing Incorporating residues Marketing
Pulses (soya beans, beans, cow peas, green grams)	Marketing	Harvesting Processing and storage Marketing	Marketing
Groundnuts	Lifting Drying Seed selection and storage	Lifting Drying Shelling Grading Storage	Seed selection and storage Shelling Grading Marketing
Roots and tubers (cassava and potato)	Harvesting sweet potatoes Storage sweet potatoes Marketing sweet potatoes	Harvesting sweet potatoes Harvesting early maturing cassava	Dimba planting for sweet potatoes Rouging diseased plants
Cotton	Picking Storage	Picking Drying Storage	Grading Marketing Storage Stalk uprooting and burning Marketing
Land resource conservation	Catchment conservation	Catchment conservation Compost making	Making firebreaks Soil conservation campaigns Pegging marker ridges Ridge realignment Catchment conservation Compost making
Livestock management	Stall feeding Vaccination against rabies Disease surveillance Deworming Meat inspection	Collecting crop residues Stall feeding Deworming Meat inspection Disease surveillance	Repairing livestock houses Removing manure Stall feeding Deworming Disease surveillance Meat inspection

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SUGGESTED ACTIVITIES THIS MONTH

Crop/commodity	**Karonga and Mzuzu**	**Kasungu, Lilongwe and Salima**	**Blantyre, Machinga and Shire Valley**
Maize	Harvesting	Harvesting Storage Actellic dusting Garden preparation Planting for winter	Purchasing inputs Marketing Planting dry season crop
Rice	Garden preparation Marketing Maize storage	Harvesting Drying Marketing Garden preparation Purchasing inputs grading	Harvesting Marketing Grading
Sorghum	Marketing	Harvesting	Land clearing Residue incorporation Marketing
Pulses (soya beans, beans, cow peas, green grams)	Harvesting	Harvesting Garden preparation Purchasing inputs	Harvesting
Groundnuts	Lifting Drying Seed selection storage	Lifting Drying Shelling Grading Storage	Marketing
Roots and tubers (cassava and potato)	Storage Marketing	Nursery preparation Planting of sweet potatoes in dimba Rouging diseases cassava plants	Weeding dimba crop
Cotton	Picking Storage	Bulking Grading Marketing Purchasing inputs Stalk uprooting	Picking Grading Storage Stalk uprooting and burning Marketing
Land resource conservation	Conducting conservation campaigns Making compost Making firebreaks Fencing agroforestry trees	Conducting conservation campaigns Compost making Protection of agroforestry trees	Ridge realignment Pegging marker ridges Making compost manure Conservation campaign Protecting agroforestry trees
Livestock management	Stall feeding Disease surveillance Meat inspection	Repairing livestock houses Stall feeding Deworming Disease surveillance Meat inspection	Repairing livestock houses Stall feeding Disease surveillance Meat inspection

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REVIEW NOTES FOR JUNE

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SUGGESTED ACTIVITIES THIS MONTH

Crop/commodity	**Karonga and Mzuzu**	**Kasungu, Lilongwe and Salima**	**Blantyre, Machinga and Shire Valley**
Maize	Harvesting Marketing Garden preparation	Garden preparation Buying inputs Planting dry season crop	Purchasing inputs Marketing Planting dry season crop
Rice	Weeding Bird scaring	Marketing Sowing dry season crop Transplanting dry season crop Purchasing inputs	Marketing wet season crop Purchasing inputs Incorporating crop residues Sowing irrigated rice Weeding irrigated rice
Sorghum	Marketing	Weeding Bird scaring	Land preparation Marketing
Pulses (soya beans, beans, cow peas, green grams)	Marketing	Marketing Garden preparation Purchasing inputs	Marketing
Groundnuts	Shelling Grading Storage Marketing	Marketing Garden preparation Purchasing inputs	Marketing
Roots and tubers (cassava and potato)	Harvesting Weeding cassava	Sweet potato nursery planting Rouging diseased cassava plants	Cassava processing Nursery planting weeding
Cotton	Storage Picking Grading Stalk uprooting	Marketing Picking Storage Stalk uprooting and burning	Uprooting and burning stalks
Land resource conservation	Controlling bush fire Conducting soil conservation campaigns Ridge realignment	Conservation campaigns Compost making Pegging marker ridges Pruning hedge rows	Establishing nurseries for agroforestry trees Soil conservation campaigns Vertiver nursery preparation Making agroforestry buffer strips Compost making Ridge realignment
Livestock management	Collecting crop residues Stall feeding Khola construction/repair Disease surveillance Meat inspection	Vaccination against NCD Stall feeding Meat inspection Disease surveillance Anti-rabies vaccination campaign	Stall feeding Disease surveillance Meat inspection

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SUGGESTED ACTIVITIES THIS MONTH

Crop/commodity	**Karonga and Mzuzu**	**Kasungu, Lilongwe and Salima**	**Blantyre, Machinga and Shire Valley**
Maize	Maize storage Purchasing inputs Garden preparation	Garden preparation Purchasing inputs Manure application Planting dry season crop	Purchasing inputs Garden preparation Manure application
Rice	Bird scaring	Weeding Fertilizer application	Transplanting Weeding irrigated rice Fertilizer application Weeding
Sorghum		Bird scaring	
Pulses (soya beans, beans, cow peas, green grams)	Marketing		Garden preparation
Groundnuts	Shelling Grading Storage Marketing	Garden preparation	Purchasing inputs Ridging Manure application
Roots and tubers (cassava and potato)	Harvesting cassava Weeding in cassava	Processing cassava Nursery management Weeding Harvesting dimba crop	Harvesting cassava Garden preparation
Cotton	Storage Picking Grading Stalk uprooting and burning	Uprooting stalks Garden preparation Marketing Purchasing cotton packs	Garden preparation Ridging Purchasing inputs
Land resource conservation	Ridge realignment Soil and water conservation campaign Making compost manure Pruning hedge rows	Conducting conservation campaigns Compost making Pegging marker ridges Pruning hedge rows	Laying buffer strips Vertiver nursery site preparation Making firebreaks Conservation campaigns Ridge realignment Pruning hedges
Livestock management	Stall feeding Constructing and repairing livestock houses Disease surveillance Meat inspection	Vaccination against NCD Stall feeding Meat inspection Disease surveillance Anti-rabies vaccination campaign	Repairing livestock houses Removing manure Constructing livestock houses Selecting breeding stock Arranging mating groups Lumpy skin disease vaccination Anti-rabies vaccination Back quarter disease vaccination

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Tips for the week:

SEPTEMBER

SUGGESTED ACTIVITIES THIS MONTH

Crop/commodity	Karonga and Mzuzu	Kasungu, Lilongwe and Salima	Blantyre, Machinga and Shire Valley
Maize	Purchasing inputs Garden preparation Manure application	Garden preparation Manure application Purchasing inputs	Garden preparation Purchasing inputs Manure application
Rice	Bird scaring Harvesting Marketing	Weeding dry season crop Fertilizer application in dry season crop	Transplanting Fertilizer application Weeding
Sorghum	Harvesting Marketing	Garden preparation	Purchasing inputs Ridging Manure application
Pulses (soya beans, beans, cow peas, green grams)	Garden preparation	Garden preparation	Garden preparation
Groundnuts	Garden preparation	Garden preparation	Marketing Ridging Purchasing seed
Roots and tubers (cassava and potato)	Harvesting cassava	Nursery management Watering sweet potato Planting cassava in dimba	Harvesting cassava Garden preparation
Cotton	Stalk uprooting and burning		Garden preparation Ridging Purchasing inputs
Land resource conservation	Agroforestry nursery preparation Soil conservation campaigns Vertiver nursery preparation Ridge realignment	Pegging marker ridges Agroforestry nursery preparation Conduct conservation campaigns Ridge realignment	Laying buffer strips Preparing agroforestry tree nurseries Soil conservation campaigns Vertiver nursery preparation Ridge realignment
Livestock management	NCD vaccination Stall feeding Disease surveillance Meat inspection	NCD vaccination Meat inspection Disease surveillance Anti-rabies vaccination campaigns	Vaccination against black quarter disease Establishing nurseries Constructing kholas Selecting breeding stock Arranging mating groups Disease surveillance Lumpy skin disease vaccination Meat inspection Rift valley fever vaccination

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OCTOBER

SUGGESTED ACTIVITIES THIS MONTH

Crop/commodity	**Karonga and Mzuzu**	**Kasungu, Lilongwe and Salima**	**Blantyre, Machinga and Shire Valley**
Maize	Garden preparation Manure application	Purchasing inputs Planting Basal dressing Weeding	
Rice	Weeding dry season crop Fertilizer application	Harvesting dry season crop Nursery preparation Marketing dry season crop Sowing	
Sorghum	Garden preparing Purchasing inputs	Planting Basal dressing	
Pulses (soya beans, beans, cow peas, green grams)	Garden preparation Purchasing inoculum Purchasing seed	Planting	
Groundnuts	Garden preparation Purchasing seed	Weeding Supplying	
Roots and tubers (cassava and potato)	Garden preparation Harvesting	Garden preparation Ridging Planting Harvesting cassava	
Cotton	Garden preparation	Garden preparation Manure application Sowing	
Land resource conservation	Tree nursery establishment Pruning hedge rows Pegging marker ridges Ridge realignment	Agroforestry nursery establishment Pruning hedge rows Vertiver nursery preparation Ridge realignment	
Livestock management	NCD vaccination Constructing livestock houses Selecting breeding stock Arranging breeding stock Arranging mating groups Stall feeding Lumpy skin disease surveillance Disease surveillance Deworming Black quarter vaccination Meat inspection		

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PRECISION
SPORT SUPPLEMENTS

NOVEMBER

SUGGESTED ACTIVITIES THIS MONTH

Crop/commodity	Karonga and Mzuzu	Kasungu, Lilongwe and Salima	Blantyre, Machinga and Shire Valley
Maize	Garden preparation Purchasing inputs Manure application	Purchasing inputs Planting Basal dressing Supplying Weeding	Planting Basal dressing Weeding Supplying
Rice	Nursery preparation for wet season crop Scaring birds in dry season crop	Harvesting dry season Nursery preparation Marketing Sowing	Bird scaring Sowing wet season crop
Sorghum	Ridging	Planting Purchasing inputs	Planting Weeding
Pulses (soy beans, beans, cow peas, green grams)	Garden preparation	Garden preparation Planting	Planting Supplying
Groundnuts	Garden preparation	Weeding Supplying	Planting Weeding Supplying
Roots and tubers (cassava and potato)	Garden preparation Harvesting cassava	Ridging Planting Harvesting cassava	Harvesting cassava Intercropping Rouging diseased plants
Cotton	Garden preparation	Planting Supplying Thinning	Thinning Weeding Planting Scouting Purchasing inputs Spraying
Land resource conservation	Nursery management for agroforestry Ridge realignment Pruning hedge rows	Nursery management Ridge realignment Vertiver nursery preparation Pruning hedge rows	Gulley control Nursery management Ridge realignment Pruning hedge rows
Livestock management	Land preparation Pasture establishment Nursery establishment Selecting breeding stock Constructing livestock houses Strategic dipping	Garden preparation for pasture establishment Shrubs and tree nursery establishment Deworming Selecting breeding stock Arranging mating groups Mastitis control Meat inspection strategic dipping Disease surveilance	Shrubs and tree nursery establishment Deworming Strategic dipping Disease surveillance Meat inspection

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SUGGESTED ACTIVITIES THIS MONTH

Crop/commodity	Karonga and Mzuzu	Kasungu, Lilongwe and Salima	Blantyre, Machinga and Shire Valley
Maize	Planting Purchasing inputs Basal dressing	Planting Basal dressing Stalk borer control Weeding Top dressing	Compost making Supplying Weeding Top dressing
Rice	Harvesting dry season crop Transplanting wet season crop	Transplanting Sowing Fertilizer application for wet season crop	Sowing wet season crop Transplanting wet season crop Weeding
Sorghum	Planting	Planting Basal dressing	Weeding
Pulses (soy beans, beans, cow peas, green grams)	Garden preparation Planting Weeding	Planting	Planting Supplying Weeding
Groundnuts	Planting Supplying	Banking	Planting Weeding
Roots and tubers (cassava and potato)	Planting	Planting Harvesting cassava	Planting
Cotton	Planting	Weeding Scouting Spraying Thinning	Scouting Spraying Weeding
Land resource conservation	Planting agroforestry trees	Transplanting agroforestry trees	Constructing check dams Planting agroforestry trees Composting making
Livestock management	Pasture establishment Nursery establishment (shrubs and fodder trees) Selecting breeding stock Arranging mating groups Strategic dipping Meat inspection Disease surveillance	Nursery establishment (shrubs and fodder trees) Strategic dipping Meat inspection Disease surveillance	Strategic dipping Meat inspection Disease surveillance

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Recommendations for Sustainable Crop Production in Malawi

Good crop husbandry practices
Combinations of the following husbandry practices are recommended for farmers to realize significant increase in yields with minimum extra cost. Extension workers are encouraged to promote these good agriculture practices.

Early Field Preparation
Field preparation should be carried out soon after harvest, when the soil is still moist and therefore easy to till. This ensures deep ploughing and good decomposition of the incorporated crop residues. It also improves soil structure and minimizes surface run-off. Where this is not practicable, farmers should aim at having fields ready by the end of September so that they can plant with the first planting rains.

Use of Manure
Most farmers are aware of the advantages of animal manures and crop residues incorporated into the soil. The ever-increasing cost of chemical fertilizers makes proper use of manures even more important.

Manures not only supply plant nutrients to the soil but also improve its structure, thus increasing water and nutrient-holding capacity. Where manures are used in combination with chemical fertilizers, crops grow vigorously. Yields and quality are also improved.

Extension staff members should provide technical advice on how to incorporate crop residues, make and manure.

Use of Good Seed or Planting Material
It is important that farmers use seed and planting material that will germinate, establish well and grow into a healthy crop. For example, in maize, farmers can select good seed from open-pollinated varieties for two to three successive seasons.
With hybrid varieties, however, recycled seed gives poor performance.

Early Planting
Crops need to be planted early as recommended to take advantage of the full rainy season. Late planted crops risk insufficient moisture stress at critical periods as well as increased pest and disease attack, reduced growing period and nutrient uptake.

- Farmers should therefore plant all crops early, as recommended.

Optimum Plant Population Density
Optimum plant population leads to high yields because it sufficient plants per unit area and minimal competition for nutrients, moisture and sunlight. In addition, optimum plant populations suppress weed growth, minimize soil erosion and may in some instances reduce pest severity.
The right plant population is achieved by:

- Correct spacing between ridges or planting rows.
- Correct spacing between planting stations on the ridge or row.
- Correct number of seeds or seedlings planted or sown per planting station or bed.

Timely Weeding
Weeds deprive crops of plant nutrients, moisture and sunlight. They may also harbor pests and diseases that cause yield reductions. To reduce competition, it is important that farmers weed their crops frequently.

Intercropping
Intercropping enables farmers to harvest more than one crop in the same season from the same plot, thereby obtaining maximum benefit from it. Other benefits include moisture retention, crop support, soil fertility improvement, soil erosion control, and pest and disease control.

Crop Rotation
Crop rotation is a practice of growing different crops on a piece of land in successive years. In rotation, deep-rooted crops and crops of the same family should not follow each other. For example, maize grown after tobacco, cotton and groundnuts has shown high yields. Growing the same crop on the same piece of land year after year results in poor yields and quality unless expensive management practices are employed because certain diseases and insect pests build up in the field and some important plant nutrients get depleted in the soil. For instance, continued mono cropping in maize fields results in witch-weed infestation.

It is therefore important that agricultural staff members help farmers to work out rotation plan so that crops of the same family do not follow each other.

Crop Hygiene
Insect pests and diseases can severely reduce yields and lower the quality of produce. The incidence of pests and diseases can be reduced without necessarily using pesticides, for example, observe during the closed season in tobacco and cotton; burning or burying infested materials away from the field, and destroy volunteer crops.

Farm Planning and Management
To make proper use of available resources, any farm requires planning. Agricultural staff members should assist farmers in formulating an appropriate farm plan so that there is efficient use of land, water, labor, time, money and other resources.

Soil and Water Conservation

Soil conservation is the protection, maintenance, rehabilitation, restoration and enhancement of soil resources and the management and use of soil resources to ensure the sustainability of such use. Water conservation assists in ensuring that there is increased infiltration of water in the soil so as to provide for plant needs and reduce erosion caused by runoff.

Soil and water conservation entails a number of technologies, such as marker ridges and ridge alignment, vetiver planting/establishment, gully reclamation and rainwater-harvesting techniques such as box ridges, raised footpaths, swales and infiltration pits.

The following are benefits of soil and water conservation:

- Reduces water runoff and soil erosion.
- Conserves soil moisture for plant growth and development.
- Improves crop and pasture yields.
- Increases groundwater supplies.
- Reduces siltation and flooding.

Soil and Water Conservation Practices

Contour Ridging

To control runoff and soil loss, ridges should be cultivated along the contour.
Peg and construct contour marker ridges to serve as guides when realigning planting ridges. It is better to make marker ridges in the dry season so that planting ridges could be realigned before the next season.

Instruments for marking contour lines

Low cost instruments used in making contour line are A-frame, line level and Phiri Lino frame: The following materials are required to make the above instruments: -

i) The A-frame

- 2 m of string
- 1 stone
- 3 nails or string to tie the frame together
- 1 panga knife
- pegs to mark contour
- 1 hammer or rock or anything for driving pegs into the ground
- Three 1.6 to 2 m poles

ii) The Line Level

- 1-line level
- 5 m of string
- 2 wooden poles, 1.6 to 2 m long with flat ends
- 1 knife
- pegs to mark contour lines
- 1 hammer or rock or anything for driving pegs into the ground

iii) The Phiri Lino Frame

- One Line Level
- 25 m of string
- 4 wooden poles with flat ends (two 3 m long, one 25 m long and the other one 2 m long)

Procedure for Making Pegging Instruments

i) A-frame

- Trim ends of 3 m poles to make them flat and tie or nail their tops together. Then tie or nail the crossbar to the upright sticks 1 m from the bottom to form an A shape. Ensure that the bottom ends of the upright sticks are as far apart as possible to increase distance between pegs.
- Hang a string from the top of the two upright sticks with a stone tied to the end so that it hangs 5 to 10 cm below the crossbar.
- Place the A-frame on level surface. Let the string settle, and then mark an exact spot where it crosses the horizontal stick. Mark the exact positions of the 2 upright sticks on the floor. Then switch the positions of the frame legs. If the calibration is correct, the string will hang precisely over the central point. The A-frame is perfectly level when the string hangs precisely over this central point. If the string is not perfectly centered both times, check that the floor is level and that the frame is tied securely. Adjust the set-up as needed.

ii) Phiri-Lino Frame

- Trim ends of 3 m poles to make them flat and tie or nail their tops together. Tie 2.5 m poles across the other two poles about 1 m from the bottom to form an A shape. Above it, tie the 2 m cross stick parallel to the other one to make the frame strong. Ensure that the bottom ends of the upright poles are as far apart as possible to increase distance between the pegs.
- Cut a groove around each of the 3 m sticks at exactly the same height above the ground halfway between the 2 cross sticks.
- Tie the ends of the string in each groove.
- Hang the level between 2 knots in the center of the string to stop it from sliding.
- Test the operation of the equipment by following steps for the line level.

iii) Line Level

- Trim the ends of the sticks to make them flat. Then place them upright on the level ground. Cut a groove around each stick at exactly the same height (chest level).
- Hang the line level centrally on the string and tie a knot on each end of the level to stop it from sliding.
- Tie the string ends in the groove of each stick.
- Set the two sticks on a level surface with the string tight. Mark their exact positions on the ground and read the line level. Then switch the positions of the sticks and read the level again. If the bubble on the level is not perfectly centered both times, check that the ground is level, that the groove heights of both sticks are identical, and the level is hanging properly.

Pegging Contour Lines

(i) Use of A-frame and use of Phiri Lino Frame

The A-frame and Phiri Lino frame are used in the same way. The only difference is that readings from a Phiri Lino are made on the spirit level on the string fixed to the frame. Two people are required to do pegging using these instruments and following steps:

Step 1: Insert a peg at the starting point of the line, and position one leg of the A-frame next to it. Avoid depressions or stones, ridges and humps.

Step 2*:* Hold this leg in place; move the other one up or down slope until the string hangs precisely over the mark on the cross pole (A-frame) or the bubble is precisely centered (Phiri Lino). Insert a peg at this point of the leg.

Step 3: While holding the second leg in place; pivot the first one round and move it up or downslope until the string hangs exactly over the mark and again the bubble is precisely centered. Drive another peg at this point.

Step 4: Continue pivoting across the slope until you reach the end of the field, pegging the position of the legs as you go.

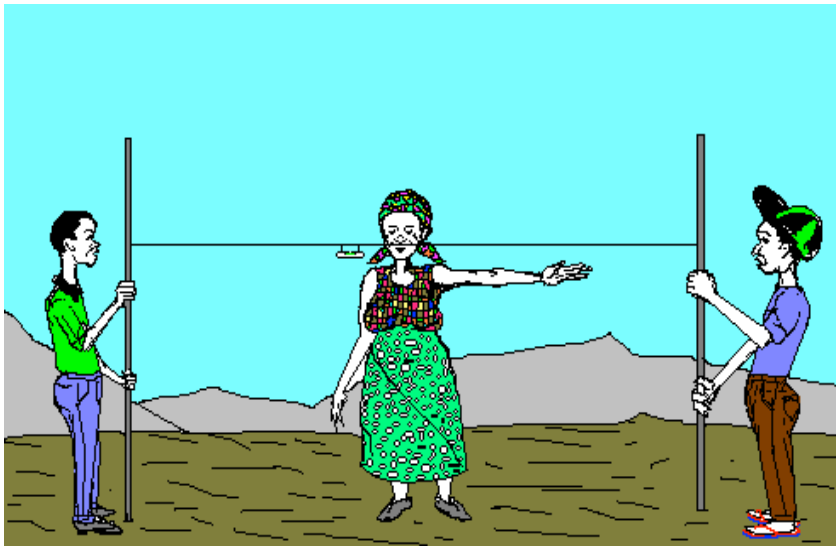
Step 5: Moving down the slope to the next contour line. The interval depends on the slope of the field, i.e. 20 m apart on a gentle slope, 15 m for medium slopes and 10 m for steep slopes.

ii) Use of Line Level

Three people are needed for this exercise and will be referred to as A, B and C.

Step 1: Start pegging at the top of the field about 20 m below the upper corner.

Step 2-4: Locate the starting point by asking C to instruct A to insert a peg next to his stick. Have C instruct B to move 5 m along the estimated contour line with the string tight.
Have C read the position of the bulb. He/she instructs B to move up or down the slope until the bubble is precisely centered.
Have B insert another peg precisely at the point where his or her stick is located.



Farmers using a line level:
Source: Rainwater harvesting technical field manual, DLRC. 2013

Step 5: Have B stay in his/her position while A moves past B to locate the next peg Have C.
Instruct A to move up or down the slope while reading the line level.

Step 6: Follow step 4. When the bubble is perfectly centered, insert another peg on A's stick.

Step 7: Repeat steps 2-6 above till the end of the field is reached.

Smoothing contour lines
Pegged contour lines need to be smoothed to reduce sharp angles between them. This simplifies building marker ridges and planting ridges realignment.
Move pegs only on uniform terrain as follows:

- Have three people each stand by the first three pegs in the line. Move the middle peg (No. 2) so that all three pegs are in a straight line.
- Have all three people then move two pegs forward, i.e. pegs 3, 4 and 5. Move the middle peg (No. 4) so that pegs 3, 4 and 5 are in a straight line.
- Repeat this until the line is finished. The line will now follow the gradual curve.
- Contour lines on irregular terrain should not be smoothed, as it would cause runoff problems.

Building marker ridges
Once pegging of contour lines is over, they should be built into ridges. The marked ridges serve as guides for realigning planting ridges.

Realigning crop ridges
After marker ridges are built, align crop ridges parallel to them. Align the top half of the area to the top marker ridge, and bottom half to the lower marker ridge.

Box Ridges
In areas with low rainfall, where erratic rains are experienced, box ridges should be put in place to catch and conserve rainwater so as to ensure adequate soil moisture for crops.

Box ridges should be constructed across planting ridges to create micro catchments for increased water infiltration and reduce soil erosion.

Box ridges should be constructed across the entire furrow perpendicular to planting ridges but slightly lower to allow spill over Space them 1 to 3 m apart depending on the terrain and rate of water flow within the field.

Gully Reclamation
A gully is a large ditch formed by erosion. It indicates an advanced or severe stage of erosion. Before undertaking any gully reclamation, it is important to first conserve the whole catchment where the problem originates by planting trees or contour ridging. The most common and cheap method of gully reclamation is by using check dams.

Check dams are simple structures that can check gully erosion by slowing down water flow or runoff in the drainage system as well as trapping sediments. Three types of check dams, which are widely used, include: stone check dams, brushwood check dams and live check dams.

Stream Bank Protection
Riverbanks should be protected to stabilize stream flow and to reduce risk of flooding, siltation, landslides and loss of arable land.

Demarcate a strip along the stream channel to cover the banks about 5 m wide on each side for small streams and 10 to 20 m for big rivers.

Plant vertiver grass (0.45 m x 0.2 m) and bamboo (1mx1m) in strips along the river banks. Several tree species such as *Acacia galpini, A. polycantha, A. siberana, Faidherbia albida, Zizphus abyssinica, Z. mauritiana* and *Z. mucronata,* can also be planted in strips at 2 m x 2 m.

Conservation Agriculture

Conservation agriculture (CA) is a cropping system that aims to conserve agriculture resources and achieve acceptable profits together with high and sustained yield levels while concurrently serving the environment. Conservation agriculture is being promoted in Malawi as an ecologically sound cropping system capable of boosting crop yields and increasing resilience to climate variability and change.

Conservation agriculture can be applied under almost all soil-climate-crop combinations, but is perhaps most effective in increasing and stabilizing yields where low or uneven rainfall limits crop production. It is also suitable for areas with highly degraded, unproductive soils as a mechanism for restoring the soils. The farming system can be used in almost all crops, including maize, grain legumes, cotton, sunflower, and root and tuber crops. Research is under way to quantify the pros and cons of CA with legumes and crops other than maize.

Principles of conservation agriculture:

- Minimal soil disturbance.
- Year-round ground cover.
- Crop rotations (e.g. maize-legume rotations) and associations (intercropping and successive cropping).

Advantages/benefits

Conservation agriculture benefits can be immediate or medium to long-term:

- Improves soil water infiltration due to surface crop residue retention and improved continuous soil pore system in the absence of soil tillage.
- Reduces water runoff and soil erosion by reducing raindrop impact by maintaining mulch-covered soil surfaces.
- Reduces soil moisture evaporation because as mulch-covered soil protects the soil surface from direct solar radiation.
- Reduces moisture stress in times of midseason droughts or dry spells.
- Reduces weed infestation.
- Increases soil organic matter (SOM) resulting in improved soil structure, increased cation exchange capacity (CEC) and nutrient availability, and improved water-holding capacity.
- Increases and stabilizes crop yields.
- Significantly reduces costs of production (mainly manual labour for land preparation and weeding).
- Increases soil biological activity, thus improving soil aeration, water infiltration and rate of decomposition.
- Significantly reduces witch weed (*Striga asiatica L*) in maize-cowpea cropping systems.
- Increases net benefit per unit of kwacha invested.

Requirements for Starting Conservation Agriculture

Land preparation

- Prepare the field soon after harvesting before the onset of the rains (to get rid of compaction, perennial weeds and acidity problems).
- Produce sufficient ground cover. In the initial year, apply 2.5 to 3 tons of crop residues per hectare as soil cover in the field.

  Note: CA is not a biomass transfer technology. Therefore, it is not advised to transfer crop residues from the neighboring gardens.

- Retain the residues from the harvested crop as soil cover in the second and future seasons maize stalks residue from legume harvest and green manure cover crops are recommended for use in CA.

Implementing conservation agriculture

- Use a dibble stick/hoe to seed your crops. When using a hoe, make one stroke that does not create a basin.
- It is important to achieve good weed control, where necessary, pre- and post-emergence herbicides can be used, for e.g., apply harness herbicide before planting or after planting, but before crop emergence to kill weed seeds; apply glyphosate herbicide to any living weeds. Consult the herbicides bottle labels for prescribed rates and safety cautions.
- If landholding size is small, start with a maize-legume association to achieve food security while reaping the additional benefits from the legume, e.g., additional residues, nitrogen, and pest and weed control.
- Talk to the farmers who are practising conservation agriculture and learn from their experiences and mistakes. The experiences of farmers who have been implementing conservation agriculture for a while can assist farmers new to CA in recognizing key practices that generate success and mistakes to avoid. Information sharing and exchange of experiences is necessary for farmers who are starting with conservation agriculture.
- Before starting conservation agriculture, a good crop rotation plan is essential.
- Basal fertilizer application in maize or some legumes need to be done at planting or day after planting.
- Planting specifications: maize should be planted in rows spaced at 75 cm apart with 25 cm between, when no basins or pits are used. Groundnuts and soya bean are planted in rows spaced at 37.5 cm and 10 to 15 cm apart respectively with 5 cm between plants. Pure stand of cowpea should be spaced at 37.5 cm between rows and 10 cm between plant stations with one seed per plant station. Intercropping cowpea in CA requires planting the cowpea in between the maize rows with 10 to 15 cm apart between cowpea plant stations and one seed per station. Intercropping pigeon pea in CA requires planting pigeon pea in between the maize rows at a distance of 75 cm from one another with two seeds per plant station.

Steps to follow when establishing a CA demo plot

- As a facilitator, survey the piece of land allocated by the lead farmer/farmer group with an aim of confirming its actual measurement and the general condition of the land and assess its viability. Remember to be accompanied by the farmers when doing this.
- Design the layout and make sure the lead farmer/farmer group to understand the reasons for everything that is being done in every plot.
- Once you have the layout, proceed to the plot with a rope, pegs, tape measure and a hammer, and demarcate the entire demo plot with the assistance of the lead farmer/farmer group.
- After the demarcation, start preparing the plots as per the agreed design layout.

Maize-Legume Crop Associations

Intercropping

- Intercropping is growing two or more different crops at the same time in the same field.
- In many parts of Malawi intercropping is an old traditional practice. Frequently, maize is grown in association with crops such as beans, cowpea, pigeon pea and pumpkins.

Principles of Intercropping

- *Choose compatible component crops with diverse morphology, geometry and density.* For example, maize and beans are compatible in that maize acts as stakes for beans while beans fixe nitrogen for maize crop. Soya bean and groundnut may not be compatible with maize because of the shading effect of the maize crop on either soya bean or groundnut.
- *Relative time of sowing for component crops*
  Cowpea is aggressive when planted at the same time with maize, so it needs to be planted after the maize is established.
- *Competitive relations including nitrogen fertilizer application and nitrogen economy*
  For example, the fertilizer applied to maize will not be taken up by the pigeon pea crop in the farming system because it responds little to fertilizers. In addition, pigeon pea has different root systems to maize and pigeon pea has an initial slow growth. Therefore, it does not compete with the maize crop during maize crop establishment, whether planted at the same time or thereafter.

Advantages/Benefits

- The system breaks the disease or pest cycle and suppresses weeds and therefore reduces the occurrence of insect pests, diseases and weeds. For example, the ground cover provided by the pumpkin will suppress weeds and conserve moisture for the maize crop. Intercropping hinders pest attacks by making it hard for the pests to locate the host crop in the system and also restricting the movement of pests and diseases from one crop to the other.
- The maize will benefit from nitrogen fixed by the grain legumes. For example, reports indicate biological N_2 fixation of 20 to 118 kg/ha for pigeon pea and 55 to 150 kg/ha for common bean.
- The shade from maize plants will protect the crops below it (for e.g. beans and pumpkins) from the strong rays of the sun and the impact of heavy rains.
- Crop diversification for food security, income generation per unit of land and reduction of risk from complete crop failure.
- Intercropping controls soil erosion by preventing raindrops from hitting bare soil, the component crops tend to cover the soil surface and allow better water infiltration.
- Intercropping maize with deep-rooting pigeon pea helps to break the hard pan.

Types of Intercropping Practices

Mixed intercropping: This is the growing of two or more crops simultaneously with no distinct row management. Pumpkins, okra, cowpeas and cucumbers are some of the crops that may be grown in this system.

Intra-row and inter-row cropping: This is the growing of two or more crops simultaneously either in the same row (intra-row cropping) or in different rows (inter-row cropping). For example, maize intercropped with beans in the same row or between rows.

Strip intercropping: This is the growing of two or more crops simultaneously in different strips wide enough to permit independent cultivation but narrow enough for agronomical interaction of the crops. For example, two rows of soya bean alternated with four rows of maize.

***Relay intercropping**:* This is the growing two or more crops during part of the lifecycle of each species. A second crop is planted after the first crop has reached its physiological maturity but before it is ready for harvest.

***Multi-story intercropping**:* This is the association of tall perennials with shorter biennial and annual crops. Maize can be intercropped with trees such as Sesbania and Gliricidia.

***Sequential intercropping**:* This is also an aspect of multiple cropping involving the growing of two or more crops in sequence on the same field in the same year. The succeeding crop is planted after the previous crop has been harvested. There is no intercrop competition, and farmers have to manage only one crop at a time.

Arrangements for Specific Crops in Intercropping System

***Maize with pigeon pea**:*

- When maize is intercropped with long-duration pigeon pea varieties such as Kachangu and Sauma the maize crop is planted at 75 cm within row plant spacing, three seeds per station and 75 cm between rows (intra-cropping).

- The pigeon pea is planted between maize stations at 2 seeds per station and 375 cm from each maize station. Planting should be done at the same time.

- Another option is to plant maize in alternate rows with pigeon pea (strip cropping). Two rows of maize planted at 75 cm row spacing and one seed per station at 25 cm apart and alternated with one row of pigeon pea planted 90 cm between plant stations in a row and three seeds per station.

- Planting should be done at the same time for medium-duration pigeon pea varieties such as Mwaiwathu alimi, Chitedze Pigeon pea 1, Chitedze Pigeon pea 2, the maize crop is planted at 75 cm within row plant spacing in rows 75 cm apart. Then pigeon pea is planted between maize plant stations with two seeds per station.

- Another option is to plant two rows of maize alternating with one row of pigeon pea. In this case, maize is planted with 75 cm between rows and 25 cm between plant stations. For pigeon pea, plant 2 seeds per plant station spaced 75 cm apart.

- Short-duration pigeon pea varieties should not be intercropped with maize because these varieties mature earlier and may not survive the shading effect from maize.

Maize with common beans:

- The maize crop is planted with 25 cm between plant stations and 75 cm between rows. The common bean is planted on the same plant station with maize. This is commonly done using climbing beans.

Maize with cowpea:

- The maize crop is planted at 25 cm between plant stations and 75 cm between rows. The cowpea is planted between maize plant stations.
- Another option is to plant cowpea in alternate rows with maize where cowpea is spaced at 20 cm apart between plant stations within a row.
- Plant cowpea after maize establishment, between 2 and 4 weeks after maize emergence.

Doubled up approach for legumes:

- This intercropping arrangement can be done for pigeon pea and groundnut, or pigeon pea and soya bean.

- Planting pigeon pea and groundnut involves planting both groundnut (75 cm x 15 cm = 88889 plants per hectare) and pigeon pea (75 cm x 75 cm) with two seeds per plant station) at their full plant population.

- The other option is to plant groundnut at full population (75 cm x 15 cm = 88889 plants per hectare) and plant pigeon pea every third row at 75 cm x 75 cm; two seeds per plant station.

Crop Rotation

Crop rotation is the alternation of subsistence, cash and green manure cover crops with different characteristics in the same field during successive years, following a previously established sequence. The principal objectives of crop rotation are achieving production that is profitable and sustainable, and maintaining soil fertility and health. It also counters the negative aspects of monoculture such as increased pests and diseases, proliferation of certain weeds and reduced yields.

Advantages/benefits

- Crop rotation gives various benefits to the soil. A well-known effect of crop rotation is the replenishment of nitrogen through the use of grain legumes in sequence with cereals and other crops. It also helps to maintain or increase soil organic matter content.
- It mitigates the buildup of diseases and pests that often occurs when one species is continuously cropped.
- It improves soil structure for better crop establishment and helps achieve a more abundant and lasting soil cover and stable extraction of nutrients by alternating root systems with different characteristics and depths.
- Improved weed control e.g. suppression of witch weed (Striga) when maize is rotated with legumes.
- Increase of soil fertility by alternating deep-rooted and shallow-rooted plants and altering crops with different nutrient requirements, for example, maize followed by groundnuts.
- Better labour distribution on the farm because different commodities have different peak labour periods.
- Overall rotations lead to higher yields compared with monoculture even if external nutrients are supplied.

Aspects to take into account when establishing crop rotations

- The same species should never be sown on the same field in the following season.
- Always include green manure/cover crops, prioritizing the production of biomass to improve soil cover and organic matter content.
- Seeding and harvest times to diversify labour and input requirements.
- Crop prices and productivity in the medium term.
- Risk involved in each crop.

Proposed production systems with crop rotations

- Design and implement crop rotations according to the various objectives: food and fodder production (grain, leaf and stalks), residue production, pest and weed control, nutrient uptake and biological subsurface mixing/cultivation.
- Most of the smallholder farmers' fields in Malawi are dominated by the maize crop, so crop rotations require that the maize crop is rotated with legumes such as groundnut, soya bean, cowpea, common beans, cotton and pigeon pea in both conventional farming practices and conservation agriculture. Apart from legumes, maize can also be rotated with roots and tuber crops such as cassava and sweet potatoes.
- Some maize-based crop rotations on smallholder farms in Malawi include:
    - Maize-cotton, maize-soya bean, maize-groundnut, maize-tobacco.
    - Apart from grain legumes, farmers can also plant green manure/cover crops (GMCCs) as inter- or relay crops for the sake to accumulate nitrogen in the soil, control weeds, and produce residues and ground cover.
    - GMCCs are not primarily planted to generate additional income (seed or grains). For farmers with land to put some into fallow, it is advisable to plant these areas with GMCCs to improve the degraded soil.
    - Typical green manure cover crops in Malawi include velvet beans (*Mucuna pruriens*) sunhemp (*Crotalaria juncea*), *Tephrosia vogelli and Lablab purpureus.*

Variety Recommendations for Important Crops in Malawi

The following section presents some of the varietal recommendations for important crops in Malawi. For more details on recommended agronomic practices please refer to the Guide to Agricultural Production Handbook.

Maize

Maize is an important staple crop in Malawi. It is grown throughout the country under rain-fed, irrigated or residual moisture (dimba) conditions.

- The national aims are to attain and maintain self-sufficiency in maize production at the household and national levels.
- At present, average yields range from 2,000 to 3,000 kg per hectare for hybrids and 1,400 to 2,400 kg per hectare for open pollinated varieties (OPVs). However, up to 10,000 kg per hectare for hybrids and 5,000 kg per hectare for OPVs can be achieved with good management.

Maize production areas in Malawi

Maize production areas in Malawi are classified as follows:

- *Low-altitude areas*
  These are less than 600 m above sea level (masl). These areas are characterized by high summer temperatures of about 30^{o}C or more. They are relatively flat and have a generally short rainy season of between 3 and 4 months long. The average rainfall is between 700 and 800 mm per annum. These areas are also called marginal maize growing areas and are associated, with erratic rains and frequent droughts. Examples are the Shire Valley, Philomel Plain, Lakeshore Plain and Upper Shire Valley from Kapichira Falls to Mangochi and the Nkhamanga Plain. Quick or early maturing varieties are best suited for these areas.

- *Medium-altitude areas*
  These are main maize growing areas and making about 60 percent of the total maize area in Malawi Altitude ranges from 600 to 1,300 masl. These areas are characterized by moderate temperatures and a fairly long rainy season of 4 to 5 months, with an average rainfall of about 875 mm per year. Examples of such areas include the Lilongwe-Kasungu plain, Upper South Rukuru Valley, Shire Highlands, and Chitipa plain.

- *High-altitude areas*
  These are areas above 1,300 masl and are characterized by cool temperatures and overcast conditions. Maize is slow to mature because of low temperatures. Examples of such areas are Viphya and Nyika Plateaus, Kirk Range, Dedza Hills, Dowa Hills and Misuku Hills.

The table below shows some maize varieties and their recommended agroecologies.

Variety	Maturity period	Attributes	Recommended agro-ecological zone
DKC 8033 (Mtetezi)	Early-to medium - maturing hybrid variety	Prolific white hard dent-grained	Medium altitude areas
DKC 8053	140 days	Flint grain texture; tolerant to gray leaf spot (GLS), cob rots, leaf blight and common rust; susceptible to maize streak virus	Medium altitude areas

Variety	Maturity period	Attributes	Recommended agro-ecological zone
		(MSV)	
DKC 8073	120-140 days	Large grains Good husk cover; good tolerance to the most common leaf diseases such as GLS, MSV, cob rots and TLB	Adapted to a wide range of environments (700-1,350 m above sea level) that receive between 550 and 950 mm of rain per year.
SC 403 (Kanyani)	131 days	Tolerant to heat stress and highly tolerant to MSV and maize chloric mottle virus.	Low-altitude areas characterized by marginal rainfall conditions, such as the Lakeshore Plain and Shire Valley. This variety is also suited for *dimba* cultivation.
SC 627 (Mkango)	Medium maturing maize variety (144 days)	White, semi dent-grained hybrid	Medium altitude areas
SC719 (Njobvu)	Late-maturing variety	White semi-dent; good resistance to MSV, GLS and common rust	High rainfall areas medium altitude
Pan 53	145-150 days	Tolerant to MSV, GLS and Rust	Warm lakeshore, Shire Valley and mid altitude areas
PHB 30G19	140-160	Tolerant to GLS, MSV and northern leaf blight	Medium altitude areas to high altitude areas
ZM 721	Intermediate to late	Tolerant to biotic stresses such as gray leaf spot, rust and leaf blight	Medium altitude areas
ZM309	Extra early (110-120 days)	Resistant to maize streak virus, gray leaf spot and common rust	Low-altitude areas characterized by marginal rainfall conditions, such as the Lakeshore Plain and Shire Valley. This variety is also suited for *dimba* cultivation.
ZM523	Early	Resistant to maize streak virus, northern leaf blight, gray leaf spot and common rust It is also tolerant to drought and performs well under. Low soil fertility.	Low-altitude areas characterized by marginal rainfall conditions, such as the Lakeshore Plain and Shire Valley. This variety is also suited for *dimba* cultivation.
ZM623	Medium maturing maize variety	Tolerant to diseases, high-yielding, flint grain -poundable, palatable when roasted or boiled, tolerant to dry spells	Medium-altitude areas
Chitedze 2 QPM	Medium maturing maize variety	High lysine levels of up to 391/10g of protein; semi-flint texture which is good for pounding	Mid-altitude and low-altitude areas of Malawi
MH26	Medium maturing maize variety	High-yielding Good husk cover on cobs Tolerance to diseases	Mid-altitude and low-altitude areas of Malawi

Variety	Maturity period	Attributes	Recommended agro-ecological zone
MH30	140 days	Tolerant to moisture stress at flowering, GLS, MSV, rust and leaf blight	Mid-altitude and low-altitude areas of Malawi
MH31	140 days	Tolerant to moisture stress at flowering, GLS, MSV, rust and leaf blight	Mid-altitude and low altitude areas of Malawi
MH33	140 days	Twin cobbing Poundable and has a semi flint kernel texture; tolerates grey leaf spot, maize steak virus, rust and leaf blight	Mid-altitude and low altitude areas of Malawi
MH34	140 days	Poundable and has a semi flint kernel texture; tolerant to Grey leaf spot, Maize Steak Virus, rust and leaf blight	Mid-altitude and low altitude areas of Malawi
MH35	140 days	Poundable and most flint hybrid with a grain texture; tolerates grey leaf spot, rust and leaf blight	Mid-altitude and low altitude areas of Malawi

Note:

Rice

Rice is one of the main cereals in Malawi grown along the lakeshore, Philomel Plain, Shire Valley areas and other areas around Lake Chilwa. The national aims for rice production programs are to increase yield of both irrigated and rain-fed systems to meet domestic and export demands. The present yields are low at 1,000 to 1,500 kg per hectare for many cultivators. Yields could be increased to 3,500 kg to 4,000 kg per hectare.

Rice Varieties

Variety	Maturity period	Attributes
Faya 14M--49	150-155 days	Recommended for rain-fed systems. It has nice flavor and is therefore preferred by many communities.
Nunkile (Pussa 33)	112-140 days	Recommended for irrigated schemes since it matures early. Has moderate susceptibility to blast *(pyriculareae oryzae)*. Because of this it is not recommended in blast-prone areas such as Limphasa or mid-altitude areas.
Mtupatupa (TCG10)	130 days in the wet season and 155 days in the dry season	Recommended for irrigation schemes. The name refers to the grain because it expands when cooked.
Vyawo (ITA302)	130 days in the wet season and 150 days in the dry season	Tolerant to blast.
Senga (IET4094)	116 days in the wet season and 143 in the dry season	Recommended for irrigated schemes.
Changu (IRI 1561-250-2-2)	119 days in the wet season and 145 in the dry season	
Lifuwu (FRX78-12)	142 days	
Wambone (FRX92-14)	128 days	Scented variety. Recommended for rain-fed systems in low-lying areas.
Kameme (IRAT 170)	132 days	Recommended for upland dambos in the mid- to high-altitude areas.
Nerica 3	95-120 days	Dwarf non-aromatic rice variety. Has good cooking quality and high milling yield. The variety is suited to upland conditions such as Mchinji, Mbawa and Meru in Chitipa.
Nerica 4	100-120 days	Dwarf non-aromatic variety. With potential yields up to 5,000 kg per hectare. It is suited to upland areas, unlike Nerica 3, Nerica 4 can tolerate late season drought.

Notes:

Sorghum

Sorghum is an important staple food in the Shire Valley and a food security crop in other marginal rainfall areas. It can also be an alternative cash crop in these areas. Sorghum is more drought tolerant than maize. This makes the crop more adaptable to these areas.

The following improved varieties are recommended.

Variety	Maturity period	Attributes
Pilira 1 (SPV 351)	100-115 days	The variety was originally recommended only for the Shire Valley, but it is now recommended for growing in other areas of the country such as, Karonga, Salima, Bwanje Valley, Rivirivi and Mpilisi. It has a spindle-shaped, and semi-compact panicle with hard and corneous white grain. It has a threshing value of 52.1 percent and a yield potential of 3,400 kg per hectare.
Pilira 2 (SPV 475)	110 - 120 days	The variety is currently only recommended for the Shire Valley. It matures between with a plant height of 15 to 18 metres. It has an elliptic-shaped exerted and semi-compact panicle with hard cream colored grain. It has a yield potential of 3,000 kg per hectare and threshing value of 48.2 percent.
PN 3	90 days	This is a short maturity (90 days) drought tolerant sorghum variety that is adapted to low and medium altitude areas (60-1000 masl). This variety is ready for harvesting by mid to end March when planted in mid to late December.
Gwiramtima	100-105 days	This is a high yielding (2,400-3,500 kg/ha), tall (331-400 cm) and very early maturing sorghum variety that is disease, insect pest and drought tolerant. It is photoperiod insensitive, and has an intermediate, hard creamy white medium- sized grain type that is highly nutritious and greatly favored by consumers because of its excellent food quality and palatable taste.
Makolokoto	130-140 days	This is a high yielding (2,100-3,700 kg/ha), tall (338-360 cm), late maturing (130-140 days) sorghum variety that is disease and insect pest tolerant, drought tolerant and photo period insensitive. It has an intermediate, hard creamy white medium- sized grain that is highly nutritious and favored by consumers.
Sinakhomo	100- 112 days	This sorghum variety has a yield potential of up to 3,000 kg/ha, is tall (338-360 cm) and is early maturing (100-112 days) sorghum variety that is disease and insect pest tolerant, drought tolerant and photoperiod insensitive. It has an intermediate, hard creamy white medium-sized grain that is highly nutritious and favored by farmers and consumers. It has an excellent polished grain quality with good food quality and taste. Sinankhomo (*meaning eating without end in Sena*) is recommended for the Shire Valley as well.
Kayera	115 -121 days	This is a high-yielding (2,100-3,000 kg/ha), tall (342-355 cm) and early-maturing (115-121 days) variety which is tolerant to disease and insect pests, drought and is photoperiod insensitive. It has an intermediate, hard creamy white medium-sized grain that is highly nutritious and preferred by farmers and consumers. It has an excellent polished grain quality, palatability and makes good flour. Kayera (meaning white- grained in the Sena) is recommended for sorghum-growing areas in Machinga, Salima and Karonga districts.

Variety	Maturity period	Attributes
Acc 967	115 -121 days	This is a high-yielding (2,000-3,500 kg/ha), tall (290-314 cm), early-maturing (115-121 days) sorghum variety that is disease and insect pest tolerant, drought tolerant and photoperiod insensitive. It has an intermediate, hard creamy white medium-sized grain that is highly nutritious and favoured by farmers and consumers. It has an excellent polished grain quality, good taste and makes good flour. Acc 967 is also recommended for sorghum growing areas in Machinga, Salima and Karonga districts.

Notes:

Pearl Millet (*Pennisetum glaucum L. Leeke*)

Pearl millet is an important food crop grown mostly in the Shire Valley. Farmers should be encouraged to grow this food crop.

Recommended varieties:

Variety	Attributes
Nyankhombo (Okashana–1)	This variety is currently recommended for the Shire Valley. It matures very early (75 to 80 days) and has a plant height of 1.9 to 2.3 m. It has a large candle-shaped panicle that measures 20 to 26 cm long. These grey grains are large and round, soft to intermediate in hardness. It has a yield potential of 2,500 kg per hectare.
Tupatupa (SDMV 89005)	It is intermediate maturing and grows 2.3 to 2.9 meters. It matures in 90 to 100 days and has a yield potential of 3,500 kg per hectare. Panicles are grey, cylindrical and 26 to 32 cm long. It has oval, medium sized grains, and intermediate hardness.
SDMV 90031	This is a high-yielding variety, yielding above 2,800 kg per hectare. It has large greyish seeds (about 11.4 g). It grows tall (177-194 cm) and matures very early. It is resistant to drought, diseases and insect pests such as stem borer.

Seeds of these varieties can be obtained from registered growers and breeders. Pearl millet is an outcrossing crop so farmers must use fresh seed each season. Farmers can also use unimproved pearl millet varieties grown in their areas.

Notes:

Wheat (*Triticum aestivum L.*)

Wheat is an important crop both for cash and food. It is mostly grown under residual moisture and rainfall showers inTsangano, Neno, Dedza, Mchinji, Ntchisi Hills, Phoka Hills, Viphya Plateau (Chikwina, Mphompha, Usingini) and Misuku Hills. There is a high demand for wheat especially amongst the urban population. The present production of about 2,000 tons per year is only about 5 percent of the total grain requirement of over 100,000 metric tons. The country imports the rest to meet the shortfall. There is need, therefore, to increase production to meet national demand.

The strategy is to promote wheat production under irrigation and residual moisture in high-altitude areas.

Variety	Attributes
Kenya Nyati	This variety is well adapted to high-altitude areas of 1,000 m above sea level or more. It performs well in these areas when the main rains are tailing off and the cool season is setting in. It is tall (90 to 100 cm) with medium to late maturity (140 to 150 days). It has a yield potential of 3,500 kg per hectare and has good baking qualities. It is susceptible to leaf rust and stem rust. All the recommended irrigated varieties do well under rain-fed conditions.
Torim 73	It is a semi-dwarf variety with a mean height of 83 cm and a yield potential of around 6,000 kg per hectare. It matures in 90 to 120 days and has a high density.
Limpopo	It is a dwarf variety (60 cm) and of early to medium maturity (90 to 120 days). It has good baking qualities and a yield potential of 3,400 kg per hectare. It is adapted to various altitudes and tolerant to leaf rust, stem rust and powdery mildew.
Jupateco 73	It is a semi-dwarf wheat variety adapted for production under irrigation in upland areas and matures in 90 to120 days. It grows to a height of 80 cm and has a yield potential of about 3,500 kg per hectare.
Loerie	It is semi-dwarf variety (75 to100 cm) which is adapted for production under irrigation in medium to upland areas. It matures in about 120 days. It has a yield potential of 4,500 kg per hectare or more.
Gamtoos	It is a semi-dwarf wheat variety which is about 75–100 cm tall and matures in about 120 days. It has a yield potential of 3,500 kg per hectare and good baking qualities.

Notes:

Legumes

Grain legumes are an important source of vegetable protein. Farmers should therefore be encouraged to grow them wherever conditions are suitable, basically for consumption, to improve farm families' nutritional status and for cash. Where land holdings are small, grain legumes should be interplanted with maize, cassava, sorghum and other suitable crops to harvest two crops per season and improve the nutrient status of the soil. Grain legumes commonly grown in Malawi are groundnuts, phaseolus beans, soya beans, pigeon peas, cowpeas, ground beans, chickpeas, field peas, guar beans, grams, velvet beans and dolicus beans.

Phaseolus Beans

Beans are a good source of protein and cash income. The green leaves are also eaten as vegetables. The crop is grown throughout the country mostly in cool plateau areas. Beans can also be grown in low altitude areas during winter months (April to July) under residual moisture. Current yields for beans in pure stands and interplanted beans are around 300 to 800 kg per hectare. Potential yields are 2,500 kg per hectare for large-seeded varieties and 2,500 kg for small-seeded varieties. The table below shows some of the recommended bean varieties.

Name	Growth habit	Days to maturity	Seed coat color
Nasaka	Dwarf	80	Tan
Bwenzi la ana	Dwarf	90	Yellow
Sapelekedwa	Dwarf	77	Blue
Kamtsilo	Dwarf	85	Red
Kanzama	Climbing	68	Red
Namajengo	Climbing	100	Red
Kambuzi	Semi-dwarf	90	Tan
Sapatsika	Semi-dwarf	90	Red
Maluwa	Dwarf	85	Red speckled
Nagaga	Dwarf	85	Tan
Mkhalira	Semi-dwarf	90	Tan
Napilira	Dwarf	90	Red speckled
Chimbamba	Semi-climbing	86	Red
Kalima	Dwarf	81	Red
Bunda 93	Climbing	84	Dark brown
NUA 45	Dwarf	72	Dark red speckled
NUA 59	Dwarf	72	Dark red speckled
VTTT924/4-4	Dwarf	90	Cream mottled

Notes:

Groundnut (*Arachis hypogaea*)

Groundnut is one of the most important food and cash crops in Malawi. It is a good source of protein, vitamins and vegetable oils. In recent years, production has not been satisfactory, so Malawi has been importing substantial amounts of vegetable oils. It is therefore important to increase production of groundnut, especially oil rich nuts.

Like other legumes, groundnut is capable of fixing atmospheric nitrogen. When grown in rotation with other crops such as maize or tobacco, it improves soil fertility and ensures sustainability of the farming system. Groundnut haulms also provide a good source of animal feed, especially in the dry season when feedstock becomes scarce.

The table below presents the characteristics of groundnut varieties.

Variety	Maturity period	Attributes	Recommended agro-ecologies
Chalimbana 2005	130-140 days	• Virginia type, large-seeded, tan coloured • 45% oil content, 2000-2500 kg/ha yield potential • Moderately resistant to rosette and early leaf spot	Medium to high altitude areas
CG7	130-150 days	• Virginia type, large-seeded, red coloured • 48% oil content, 2000-2500 kg/ha yield potential • Drought tolerant	Medium to high altitude areas
Nsinjiro	120-140 days	• Virginia type, large-seeded, tan coloured • 45% oil content, 2000 kg/ha yield potential • Resistant to rosette disease	Medium to high altitude areas
Chitala	90-120 days	• Spanish type, tan coloured • 40% oil content, 1500 kg/ha yield potential • Can be cultivated in *dambos* • Resistant to rosette disease	Low altitude areas
Baka	90-120 days	• Spanish type, pale tan • 40% oil content, 1500 kg/ha yield potential • Can be cultivated in *dambos* • Resistant to aphids which transmit rosette disease	Low altitude areas
Kakoma	90-120 days	• Spanish type, tan coloured • 40% oil content, 1500 kg/ha yield potential • Can be cultivated in *dambos,* resistant to rosette disease	Low altitude areas

Notes:

Soya Bean (*Glycine max*)

Soya bean is a very important and versatile grain legume with many uses. It has protein content of 37 percent and provides high-quality vegetable protein for humans and livestock. It is used in the production of Likuni Phala and in various other recipes at the household level, such as in the production of soya milk and meat. It is also used in feeds for poultry and other livestock. The crop is a good nitrogen fixer and therefore improves soil fertility. It is an alternative food and cash crop in areas where groundnut pops are a problem. The crop can be grown under a wide range of climatic conditions ranging from warm to the hot low-lying areas of the Shire Valley with marginal rainfall of less than 700 mm to the highlands of Nyika and Viphya Plateaus with more than 2,000 mm rainfall; and soil types ranging from sandy loams to heavy clay soils with sufficient drainage.

Variety	Attributes
Ocepara 4	Ocepara 4 is an indeterminate variety, with a very high yield potential of over 4,000 kg per ha. It is adapted for cultivation in medium plateau to upland areas characterized by a prolonged rainfall season. The variety requires a full growing season for best yields. It is a very tall plant, with broad leaves, medium-to-late maturing. A well-grown crop produces a lot of green canopy. Ocepara 4 is also resistant to root knot nematode (*Meloidogyn spp.*) so it is most suitable for cultivation in root-knot nematode-prone sandy loamy soils where other varieties would be at a disadvantage. This variety has white flowers and grey hairs. It is big-seeded (22 g per 100 seeds) and has a small light grey hilum.
427/5/7	427/5/7 is an indeterminate variety, with a very high yield potential of over 4,000 kg per ha. This variety is adapted for cultivation in medium plateau to upland areas characterized by a prolonged rainfall season (1,000 to 1,500 mm mean annual rainfall). The variety has good resistance to water logging and a light grey colour at maturity.
Santarosa	Santarosa is a determinate variety, with a yield potential of over 3,000 kg per hectare. It is adapted to all soya bean growing areas but most suited to the medium altitude areas. In high-altitude parts of the country, which are characterized by cool moist conditions, the stems of this variety may remain green while the pods are ready for harvesting. Normally the stems and pods will be brown at maturity.
Davis	Davis is a determinate, early-maturing variety which has a yield potential of over 3,000 kg per hectare. It is best suited for cultivation in areas with marginal mean annual rainfall of between 700 to 900 mm. Such areas include the low lying, warm to hot Lakeshore areas of Salima, Bwanje Valley and the Shire Valley. This variety has white flowers and grey hairs. It has big rounded cream seeds (22 g/100 seeds) with a small light gray hilum. At maturity the variety takes about 23 days to shatter and has medium to strong resistance to water logging.
Bossier	Bossier is a determinate, early maturing (110 -120 days) variety with a yield potential of over 3,000 kg per hectare. Like Davis, it is best suited for cultivation in areas with a short rainfall season and a mean annual rainfall of between 700 and 900 mm. Areas including the low lying, warm to hot Lakeshore areas of Salima, Bwanje Valley and the Shire Valley are best suited to this variety. This variety has violet flowers and grey hairs; its rounded cream seeds are of medium size (18 g per 100 seeds) with a small grey hilum. At maturity the dry plants and pods will be brown with a medium to strong logging and shattering resistance.
Duocrop	Duocrop is an indeterminate variety with a very high yield potential of over 4,000 kg per hectare. Like indeterminate varieties is adapted for cultivation in medium plateau to upland areas characterized by a prolonged rainfall season. It is a fairly tall plant with broad leaves, medium to late maturity and medium-sized light cream round flattened seeds, which have brown hilum.
Impala	Impala is another indeterminate variety with a high yield potential of over 3,500 kg per

Variety	Attributes
	hectare. Like other indeterminate varieties. It is adapted for cultivation in medium-plateau to upland areas with a prolonged rainfall season. It is a fairly tall plant, with small finger like (lanceolate) leaves with grey hair and white flowers. The variety is medium to late maturing; the light cream round seeds are medium to big in size (22 g/100 seeds) and have a brown hilum. A mature crop takes about 21 days from maturity to shatter. The variety has good logging resistance and a light grey colour at maturity.
491/6/7	491/6/7 is another indeterminate variety, with a very high yield potential of over 4,000 kg per hectare. The variety is adapted to all soya bean-growing areas but most suited to the medium altitude and upland areas. It is a medium plant in height with brown hairs and broad green leaves. Its flowers are violet. It is medium-maturing with medium to big yellow seeds (20 g/100 seed) which have a dark brown hilum. Normally the stems and pods will be brown at maturity The variety has very strong capacity for logging water and shattering resistance.
501/6/12	501/6/12 is an indeterminate variety, with a very high yield potential of over 4,000 kg per hectare and is best adapted to medium plateau to upland areas with a prolonged rainfall season. It is a fairly tall plant, with broad leaves, late-maturing with medium to large (20 g per100 seeds) light cream rounded seeds, which have a grey hilum at maturity. This variety has white flowers and grey hairs. It takes about 23 days from maturity to shatter and has good resistance to water logging.
Kudu	Kudu is another indeterminate variety with a very high yield potential of over 4,000 kg per hectare. Like other indeterminate varieties, it is adapted for cultivation in medium plateau to upland areas with a prolonged rainy season. It is a fairly tall plant with broad green leaves with grey hair, and white flowers. The variety is medium- to late-maturing; the light cream round seeds are medium to large (22 g per 100 seeds) and have a brown hilum. A mature crop takes about 21 days from maturity to shatter. The variety has good resistance to water logging and light grey at maturity.
Hardee	Hardee is an old soya bean variety introduced into and recommended for cultivation in Malawi together with Geduld. It is an indeterminate variety with a yield potential of over 2,500 kg per hectare and like Geduld and other indeterminate varieties; it is best adapted for cultivation in medium plateau to upland areas with a prolonged rainy season. It is a medium to tall plant, with broad elongated leaves with grey hairs and white flowers. It is medium to late in maturity. It has large (20 g per 100 seeds) light cream rounded seeds that have a brown hilum at maturity. It has some resistance to both shattering and logging. It is light grey at maturity.
Geduld	Geduld is another indeterminate variety with a yield potential above 2,500 kg per hectare. Like Hardee, it is adapted for cultivation in medium plateau to upland areas with a prolonged rainy season. It is a medium to tall plant, with broad leaves and medium to late maturity. It has medium-size (20 g per 100 seeds), cream oval seeds and brown hilum at maturity. Like Hardee this variety has white flowers and grey hairs. It has strong shattering and resistance to water logging and light grey colour at maturity.

Notes:

Vegetables

National Aims

The aim is to increase production of vegetables to meet domestic demand and to improve the nutritional status of rural and urban populations and export where opportunities arise. The objective is, therefore, to encourage farmers to grow vegetables in the rainy season and in dimbas during the dry season. Farmers should be advised to preserve surplus vegetables produced during the rainy season for use in the dry season.

Vegetables are an important source of mineral salts and vitamins, which are vital for good health. In addition to being an important food crop, they provide income. Despite being widely grown in the country; adequate supplies of vegetables are mostly available in adequate supplies in the rainy season. Supplies are not adequate throughout the year. Production of some exotic vegetables such as rape, cabbage, lettuce, turnips, tomatoes, onions and leaf mustard should be encouraged. In addition to these exotic vegetables, farmers should also be encouraged to grow and preserve local and indigenous vegetables such as Bononguwe (*Amaranthus spp*.), Mnkhwani (*Cucurbita maxima*), Khwanya (*Phaseolous vulgaris*), Mwamunaaligone, (*Galinsoga parviflora*), Chisoso (*Bidens pilosa*), Kamganje (*Brassica juncea*), Chitambe (*Vigna unguiculata*) Denje (*Corchorus trilocularis, Corchorus aestuans*) and many others. To optimise yields it is important to irrigate as need arises.

Vegetables are attacked by many insects, pests and diseases. It is therefore important that farmers use only recommended pesticides and observe safety precautions, particularly time allowed between the last application and harvest.

Recommended Practices:

- Nurseries should be sited near a permanent water supply and located on new land every year so as to reduce the build-up of insect pests, nematodes and diseases. Soils should be well drained and the site should be away from shaded areas.
- Sites should be dug deeply and all large clods broken up to make a fine tilth.
    - Construct beds 20 to 25 cm high, 1m wide and to a convenient length. They
    - Should be separated by paths 45 to 60 cm wide. On sloppy lands seedbeds should
    - Be constructed on the contour.
- Apply 3 to 5kg of well-decomposed manure per square meter and mix thoroughly with the soil.
- To reduce damping-off disease and nematodes, seedbeds should be sterilized by burning maize stalks heaped at least 1m high. This should be done preferably in the morning or afternoon when the weather is calm. Alternatively, seedbeds should be fumigated with Basamid.
- Seeds should be sown 0.5 to 1 cm deep in rows 15 cm apart. Seedbeds should be mulched lightly and watered immediately.
- Apply a 5 percent solution of sulphate of ammonia (5 g dissolved in 1 liter of water) when seedlings are 2 weeks old to promote faster establishment.
- Damping-off disease should be controlled with either Benlate, Captan or Thiram. Use the chemicals as specified on the label. Use Ripcord 20 EC, 10 ml in 14 liters of water as a spray in case of an attack of cutworms or Carbaryl 85 WP at 85 g in 14 liters of water. Aphids, Thrips and Jassids may be controlled by a spray of Metasystox at 1g in 1 liter of water or Dimethoate 20 WP at the rate of 34 g in 14 liters water.

Common vegetables grown and recommended practices are as follows:

	Tomato	Cabbage	Onion	Cucumber	Eggplant	Lettuce
Potential yield (kg/ha)	18,000 - 50,000	11,000 - 70,000	22,000 - 24,000	34,000 - 44,000	35,000 - 90,000	30,000 - 40,000
Recommended varieties	Money Maker, Marglobe, Rodade, Heinz, Homestead and Roma VF	Large Head: Giant Drumhead, Sugarloaf, Hercules, Chogo, Gloria F, Maracanta and Glory of Enchuizen Small Head: Copenhagen Market, Ventura, Golden Acre, Stonehead and Gloria Osena	Early Texas Grano, De Wildt, pyramid and Red Creole	Stono, Gemin, Burpee Hybrid and Improved Telegraph	Black Beauty, Pompanol Pride and Florida High Bush	London White, Cos (Cos), Buttercrunch (Soft-leaf-cabbage-type), New York, Webbs's Wonderful and Great Lakes
Field preparation	Plough deeply	Plough deeply	Plough deeply	dig and break clods	Plough deeply	Plough deeply
Manure application per sq. metre	5 to 10 kg	5 to 10 kg	3 to 5 kg	2 to 3 kg	3 to 5 kg	2 to 3 kg
Bed size	120 cm wide and to a convenient length	120 cm wide and to a convenient length	120 cm wide and to a convenient length	120 cm wide and to a convenient length	120 cm wide and to a convenient length	120 cm wide and to a convenient length
Bed height (cm)	20 - 25	20 - 25	20 - 25	20 - 25	20 - 25	20 - 25
Fertilizer application						
Basal dressing per sq. metre	2-3 days before planting apply 100 g of "B" compound fertilizer	90 g "S" compound immediately before transplanting	60 g of "S" compound fertilizer using 2 cupful of cup no. 22	Before planting, apply compound D at the rate of 100 g per sq. meter using 3 cupful of cup no. 30.	Before transplanting apply 70 g compound D per meter using 3 cupful/cup of no. 30 or 30 g 23:21:0+4S using 2 cupful of cup no. 22 per sq. meter	Before transplanting , apply compound S at the rate of 90 g per sq. meter using 3 cupful of cup no. 30
Top dressing per sq. metre using one cupful of cup no. 22	5 weeks after transplanting with 20 g of CAN	20 g of CAN or Sulphate of Ammonia or 10 g Urea per sq. meter every 3 weeks	30 g of CAN or Sulphate of Ammonia using cup no. 30	Every 21 days until flowering with 30 g CAN per station using 1 cupful of cup no. 30	70 g CAN per sq. meter using 2 cupful of cup no. 30	50 g CAN per sq. meter using 2 cupful of cup no. 22
Transplanting time	4 weeks after sowing	4 weeks after sowing	6 to 8 weeks after sowing	direct sowing	4 to 5 weeks after sowing	when seedlings are 7 cm tall
Spacing	90 cm x 60 cm	*60 cm x 60 cm **50 cm x 45 cm	30 cm x 10 cm	60 cm x 60 cm x 4 seeds per station spaced 10cm apart	60 cm x 90 cm	30 cm x 30 cm

∗ large headed, ∗∗ small headed

Livestock Production

Indigenous Chickens

- Indigenous chickens are the most common form of poultry found in rural parts of Malawi.
- Indigenous chickens are important sources of income, food nutrients, and can be used to fulfill for cultural obligations.
- Performance of chickens is currently poor as a result of poor housing, poor disease control, poor feeding, and general lack of skills in management of the chickens.

Management of Indigenous Chickens

Housing

- Chickens need to have decent housing to protect them from rain, heat, cold, other predators and wind.
- When chickens are left to sleep in trees, outside houses and in the verandas productivity is usually low.
- It is also important to provide perches for chickens for comfort.
- Houses for indigenous chickens need to be secure and made of durable material.
- Two types of chicken houses are available. The pigeon type, and the deep liter system. It is recommended that indigenous chickens be housed in a pigeon type of housing made of durable material such as wood, bamboo or reeds.

Location of Kholas

- The khola for the chickens should be located on high ground. It might need to be close to the house for security.
- It is also necessary to have a source of water nearby.

Size of Kholas

- On average, each adult chicken needs 30 cm x 30 cm of floor space plus space for any other smaller birds. (Note: This is for a night khola; more space is required for chickens which are housed full-time).

Floors

- Dirt floors are common in most indigenous kholas.
- Famers should remember to keep the floor dry to prevent diseases.
- The floor can be a raised platform of stakes with spaces to allow the droppings to fall below. Chicken droppings form a good source of manure.

Perches

- Chickens like to be able to roost at night. They need perches especially when they are houses in a deep litter system.
- Perches should be made of wood, 3-5 cm in diameter.
- Perches should be strong and securely bound so that they do not bend, move or twist. Each adult chicken needs 20 cm of perch space.

Major Diseases for Indigenous Chickens

Newcastle Disease

- Newcastle disease is a disease that kills more indigenous chickens than any other disease.
- It is a major threat to the poultry industry in Malawi, both within the commercial and traditional (rural) sectors.
- It causes a lot of death in poultry every year.

The causative virus has many types, which are classified into three groups:

- **Lentogenic:** causing very mild disease. Often used as vaccines e.g. Lasota, Hichiner and V4.
- **Mesogenic:** Strong strains causing acute respiratory and nervous signs. Sometimes used as Vaccines e.g. Komarov.
- **Velogenic:** These are devastating strains causing very high mortality and spread easily.

Course of the disease

- The virus first infects the upper respiratory and gastro intestinal system. From here it enters the blood stream and spreads to the other internal organs, especially the liver and reproductive tract of the hen. It then spreads to other organs such as the brain.
- The incubation period is from 2-15 days (that is time from infection to the appearance of clinical signs).

Clinical signs of the disease

- Coughing, sneezing
- Twisting of head and neck, drooping wings, drugging legs, circling, paralysis
- Watery- greenish diarrhea, swelling of tissues of the head
- Varying mortality

Post mortem signs

- These can be very variable and sometimes difficult to detect. They include inflammation of the trachea, yolk peritonitis, gut hemorrhage, cloudy air sacs and hemorrhages in the proventriculus.
- There are number of diseases that present with similar signs to NCD clinically. However, the possibility of NCD increases if both respiratory and neurological signs are present.

Treatment and Prevention of NCD

- There is no treatment for NCD. However, the disease can be prevented through vaccinations.
- A number of vaccines are readily available, like 1-2, Lasota, and Hitchner in pharmacies.
- The vaccines can be given by placing a drop in the eye of the bird or through drinking water or by injection.
- The vaccines must be kept cold or they would lose their effectiveness if left out of the refrigerator for more than a few hours.

Feeding indigenous chickens

- In order to improve the productivity of indigenous chickens under a free range system it is important and necessary to provide the birds with supplementary feed.
- The farmer can use available feed ingredients to mix his own simple feed ration. This will allow the birds to grow fast and ensure their survival. Follow the following procedures:
    - Make available all the required ingredients. These include; maize grain, maize bran, soya bean and salt.

- Soya bean contains some anti nutrition factors so it should be roasted. Roast soya in a pan on open fire. Soya are ready for grinding when they look brown and start to crack.
- Do not overheat the soya beans as they may lose their nutritive value.
- Grind the maize and soya bean and maize bran at the maize meal. Ask the maize miller to remove the sieve when grinding to produce a meal of marsh form and not flour or powder.
- Grind the slat in a mortar for easy mixing.
- Measure each of the ingredient as follows:
    - 2 part maize meal or maize bran
    - 1 part soya bean meal
    - 1 part salt
- Mix all these ingredients thoroughly.
- Use a cemented floor or pail or drum for mixing
- Feed the mixed feed to birds ad libitum *(as much as the bird may eat).*
- When feed is limited give priority to young chicks first.

Which feeds have which nutrients?

- In general, grains have high levels of energy. Chickens grow well when they are fed plenty of grain-based feeds.
- All chicken feeds have energy but some feeds which are good sources of energy and which can be easily obtained in Malawi include:
    - Maize meal (mgaiwa) and maize bran (madeya, gaga)
    - Rice, broken rice and rice bran
    - Millet and millet bran
    - Cassava, sweet potatoes

- Some feeds which are better sources of protein include:
    - Beans, cow-peas
    - Cottonseed cake and ground nut cake (after oil extraction)
    - leucaena leaves and crushed leucaena seed
    - Meat and bone meal, blood, and fish meal
    - Termites

- Minerals are important especially for young growing chickens and layers. Calcium is important for bone growth and strong eggshells. Animal and fish bones, egg shells and even snail shells, can be burned and crushed and added to the feed to improve the mineral content.
- Vitamins and minerals can be obtained in commercial products called premixes. Usually, it is not necessary to add these to the diet of free-range chickens.

Goats

Goats **(Capris hicus)** are a source of protein and income to the rural population. They also supply manure, which may be used in crop production. Local goats in Malawi are hardy as far as feeding is concerned. They are prolific but do suffer from diseases just like other species of livestock. They are small to medium sized and have slow to medium growth rates. This calls for improvement. The aim is therefore to improve the productivity and off take. To achieve this objective, the following husbandry practices are recommended.

Breeds

- Apart from the indigenous goat which is mainly used for the provision of meat, the large South African Boer buck (male-goat) is available from Mikolongwe and Dwambazi livestock centres for crossing with indigenous does (female-goats) in order to increase both size and growth rates.
- Boer goats and high grade crosses are also available from the commercial and recognized stud breeders.
- The other breeds that are recommended in Malawi are: Saanen (for milk production), Torgenburg, and Alpine (for meat).

Housing

- The recommended **khola** could be constructed from mud, pole and thatch but should be well ventilated.
- Space requirements for mature does are 1.8, 0.3 sq. m for a kid and 2.8 sq. m for a buck.
- Raised slatted **Kholas** reduce worm infestation. In this type of housing, the floor of the house should be raised about 1 to 1.5m above ground level. In this way, urine will pass and manure can easily be collected. The windward side should be covered to minimize respiratory disorders.
- If a dirty floor is used, make pallets or sleeping benches or lay poles on the ground so that urine and manure can collect between these.
- The poles must, however, be removed and the ground cleaned every 2 weeks or once a month to reduce worm infestation.

Feeding

- Goats browsing ability enables it to eat on a variety of herbage. However, under confined conditions goats need to be supplemented with formulated rations.
- It is recommended to feed 230g (2 handfuls) of madeya or ration 5 per day to the does during sucking stage.
- Water should always be made available to goats. When goats are herded, they should be grazed away from dambos during the rainy season.
- When tied or tethered during the rainy season, they should be rotated 2 to 3 times a day. The length of the tether should be long enough (of about 4.5m long).
- A running tether which has a rope or wire staked at both ends with the tether attached to this staked rope with some kind of ring or loop will give the goat opportunity to forage in a wider area.
- It is recommended that goats should be herded wherever possible.
- Sweet potato vines, cassava and banana leaves are good supplements for goats during tethering.
- For stall fed goats, other forages may be tied to a pen or tree branch so that forages are kept off the ground in order to imitate browsing behavior.

Parasites and diseases

- Goats are tolerant to parasites and diseases.
- However, when goats are managed intensively they are susceptible to worms and respiratory diseases.

- Just like any other class of livestock. They should be dewormed and routinely at the beginning and end of the rainy season every year.
- Additional doses of anthelmintic may be required if animals are restricted in paddocks.

Disease control in livestock

- The department of Animal Health and Livestock Development is mandated to promote increased and sustainable livestock production and productivity through the provision of animal health and production services.

Veterinary stations

- Veterinary stations are centers where disease control services are provided. The services offered in the stations are:
    - Animal treatment
    - Vaccinations
    - Animal husbandry extension services
- The stations cater as animal health extension centers and are located throughout the country. Farmers are encouraged to bring their animals for attention.
- More specialized advice can be obtained from District Animal Health and Livestock Development Officers at District Agricultural Offices and Chief Animal Health and Livestock Development Officers based at Agricultural Development Divisions (ADD) level.

Livestock movement control

- Livestock owners are required to get a permit by law before animals are moved from one veterinary station area to another.
- Movement permits are encouraged because they serve the following purpose:
    - Prevention of spread of infectious diseases such as Foot and Mouth Disease and African Swine Fever present in an area at a particular time,
    - To curb livestock theft,
    - To show livestock ownership,
    - To control the slaughter of the immature and breedable stock.
- When moving animals, owners should have the permit ready for inspection by veterinary officers or other officials authorized by law.

Animals will not be allowed to move at night unless under special permission given by the veterinary authority.

Extension Approaches

The Department of Agricultural Extension Services uses a number of strategies and methods to deliver agricultural extension programs:

- The district agricultural extension services system.
- The model village.
- Clusters and *mindandandas.*
- Gender, HIV and AIDS mainstreaming.
- Farmers field schools and farm business schools.
- Lead farmers.
- Agricultural information resource centres.
- Multimedia agricultural campaigns.
- Farmer organizations (clubs, cooperatives and associations).

All extension workers are encouraged to implement their programs using these approaches.

Notes:

Agricultural Extension Methods and Strategies

Field Days

A field day is an event organized for a group of participants to see improved technologies being practiced on one or more farms, demonstration plots or research stations. It combines group discussions and demonstrations of results and methods as teaching methods.
Importance of a field day:

- It brings about attitude change toward new agricultural technologies.
- It stimulates the need in smallholder farmers to seek for information about the new technology.
- It creates awareness among stakeholders of new and available technologies.

Steps in conducting a field day
Planning

- Decide theme for the field day.
- Spell out the objective.
- Identify sites and farmers/committee to host the field day. These should be sites where demonstrations were conducted.
- Identify farmers to do the speaking on the day.
- Conduct rehearsals.
- Publicize the date, venue, objective, sketch a map, and starting time, and ensure that extension workers close to each other should work together.

Conducting the field day

- Welcome the participants and brief them on the objective(s) of the field day.
- Divide the participants into manageable groups.
- Take them through the prepared sites where host farmers should do the talking.
- Provide time for questions and answers or comments.
- Use the field day to get commitment and potential problems from the farmers. During processing the following questions should be asked.

Field day experience: What have you seen? What did you like most and why? What improvements can you suggest for future field days like this one?

Generalizing questions: What have you learned on this field day? Have you seen any difference with what you normally practice? Have you observed similar technology in your area? What proportion of farmers practice this technology in your area or Extension Planning Area?

Application questions: From what you have observed, what would you do differently? How many of you are going to put in practice what have you observed today? What kind of technical assistance would you require to do what you plan to do? How do you plan to implement what you have observed?

- Document the number of participants by gender.
- Document the farmers interested in practicing the technology being publicized.

Demonstrations

A demonstration is a step-by-step method of teaching smallholder farmers how to implement a particular agricultural technology. The learner is actively involved in the implementation of the technology demonstrated. Demonstration:

- Provides farmers with knowledge and skills necessary to implement a particular agricultural technology.
- Ensures full participation in the learning process.
- Provides instant feedback from the learners about the technology.
- Builds farmers' confidence about implementing the technology.

Types of Demonstrations

- Results demonstrations.
- Method demonstrations (the main focus of this handbook).

Steps for conducting a method demonstration

Preparation

- The trainer should prepare the objective(s) of the demonstration.
- The target audience should be identified.
- Materials required for the demonstration should be assembled and be locally available.
- The trainer should try the demonstration before meeting the audience.

Introduce the demonstration

- Arrange participants in a semicircle so everybody can see and hear clearly.
- Set an interactive environment.
- Indicate the topic of the demonstration.
- Explain and clarify the objectives of the demonstration.
- Find out if the objectives are clear and worthwhile.
- Find out participants' experience with the subject matter.
- Let those who have done it before demonstrate how they do it.
- Let others comment, but do not criticize.
- Acknowledge all contributions.

Arrange demonstration materials

- Display and describe all materials that have been arranged for the demonstration.
- Let participants touch the materials if necessary.
- For effective participation prepare adequate demonstration materials that will allow as many participants to participate.

Conduct the demonstration

- Ask the participants what the first step should be.
- Explain the first step and demonstrate.
- Ask for clarifying questions.
- Let two or three participants repeat the first step.
- Let the others supervise.
- Let each participant participate.
- Divide participants into pairs or small groups.
- While one performs the step, others should observe.
- Then advise them to reverse the roles.

Continue with the next step of the demonstration

- Ask participants what the next step should be.
- Conduct the next step and allow questions.
- Let two or three people take part while the rest observe.
- Allow all participants to perform the step.

Summarize the demonstration

Let one man and women participant summarize the demonstration.

Process the demonstration

Move away from the place of the demonstration to where people can sit comfortably usually under a tree or in a building.

- Ask participants to reflect on the demonstration.
- Discuss the steps of the demonstration, participants' feelings in performing the steps or some alternative ways to do some steps.

  Generalizing questions
  - Ask participants for general comments on the demonstration.
  - What works or does not work in real life situations.
  - Conclusions and lessons learnt from the demonstration.
  - Recommendations and decisions made.

  Application questions
  - Ask participants their commitment towards application of the new knowledge and skill(s).
  - Ask if there are any anticipated constraints to intention to apply the knowledge or skill.
  - Ask if there is any assistance that might be required to effect change.

Conclude the Demonstration

- Summarize key points.
- Find out if objectives of the demonstration were met.
- Thank all participants for taking part.

Tips for successful, effective, interactive demonstration

Practice first:
- Gather a small group of people who are willing to let you test the demonstration on them before you take it to the field.
- Practicing before conducting the demonstration helps improve how the demonstration is conducted.

Check equipment
- List all the equipment that you will need and ensure that all of it is in working order and in sufficient supply.

Contact farmers
- These should be farmers willing to mount a demonstration at his or her farm using his or her inputs to solve a particular technical problem.
- The extension worker's role is to ensure that the demonstration is conducted following the recommended practices.

Identification of impact points and contact farmers
- Impact points should be identified in a participatory manner at the community level. Farmers' groups should be used to make an in-depth assessment of problems under each enterprise and subject.
- Identification can also be done through normal field visits and interviews with individual farmers. When assessment is completed, a list of impact points and contact farmers should be consolidated and submitted to EPA.

If farmers say that the technology to be demonstrated is not practical
- Ask them why they may think so.

Gender and HIV Mainstreaming in Agriculture

Gender disparities and HIV issues are among the major constraints that affect agriculture development in Malawi. For example, in terms of access to and control of agriculture resources and benefits, women are said to be more disadvantaged than men and are also more affected by HIV and AIDS impacts.

Impacts of gender disparities in agriculture
The following are some of the impacts of gender disparities affecting the agricultural sector:

- Limited access to, ownership, and control over productive resources such as land, labour, financial services, income, technology by vulnerable gender categories particularly women.
- Limited access to markets by vulnerable gender categories especially when the markets are located far away from the village.
- Low participation of women in decision making on issues related to agriculture production including community meetings.
- Unequal division of labour at the household where women tend to carry out most of the farm work on top of doing other reproductive work such as fetching water, taking care of the children and cooking.

Impacts of HIV and AIDS on agriculture
HIV and AIDS, on the other hand, have devastating impacts on farming communities in Malawi, especially in the rural areas where agriculture is synonymous to livelihood security. Some of the impacts of HIV and AIDS on the agriculture sector in Malawi include:

- Diversion of income meant for agriculture production to provision of from to care, treatment and support for sick family members.
- Reduction in available farm labour as a result of sickness of family members, which may delay farm operations.
- Grabbing of agricultural equipment and inputs by relatives of the deceased.
- Increase in workload especially for women who take the responsibility of caring for the sick and orphans.
- Increased morbidity and mortality of agriculture technical staff, which results in difficulties for farmers to access extension services.

How to mainstream Gender, HIV and AIDS in Agriculture?
Gender HIV and AIDS mainstreaming refers to a process of identifying, internalizing, integrating and institutionalizing gender, HIV and AIDS issues, concerns, needs and priorities so that they are part and parcel of all agricultural development activities.

Steps in Mainstreaming Gender and HIV in Programs and Projects
The following steps should be followed when mainstreaming Gender and HIV in programmes and projects:

The 4 "I"s
Identification of Issues and Concerns

- Identification of Gender, HIV and AIDS issues and concerns is done with gender categories at community's and in collaboration with relevant stakeholders.
- Identification is done by using gender and HIV responsive participatory appraisal tools.
- It is essential that all gender categories in a community should express the issues and concerns.
- The gender and HIV issues and concerns should be quantified based on their importance and urgency for redress.

- Each project and program should indicate the gender and HIV issues or concerns it is addressing.

Internalization

- Means to be convinced and committed to deal with the identified Gender, HIV and AIDS issues and concerns.
- For farmers of all gender categories to own the issues and concerns, practical and real life experiences should be used in terms of drama, role-plays, case studies, focus group discussions and other participatory tools.

Integration

- This means addressing gender, HIV and AIDS issues and concerns in the development of the core business (subject area), objectives and interventions with active participation of all gender categories.
- The interventions should be accompanied with use of relevant Information, Education Communication (IEC) materials.
- The issues that are outside the core business should be referred to other stakeholder and partners for assistance.

Institutionalization

- Institutionalization means enhancing and scaling up implementation of Gender, HIV and AIDS responsive agricultural interventions, projects and programs.
- This can be done by organizing and strengthening support structures like Gender, HIV and AIDS committees, focal points and desk officers.

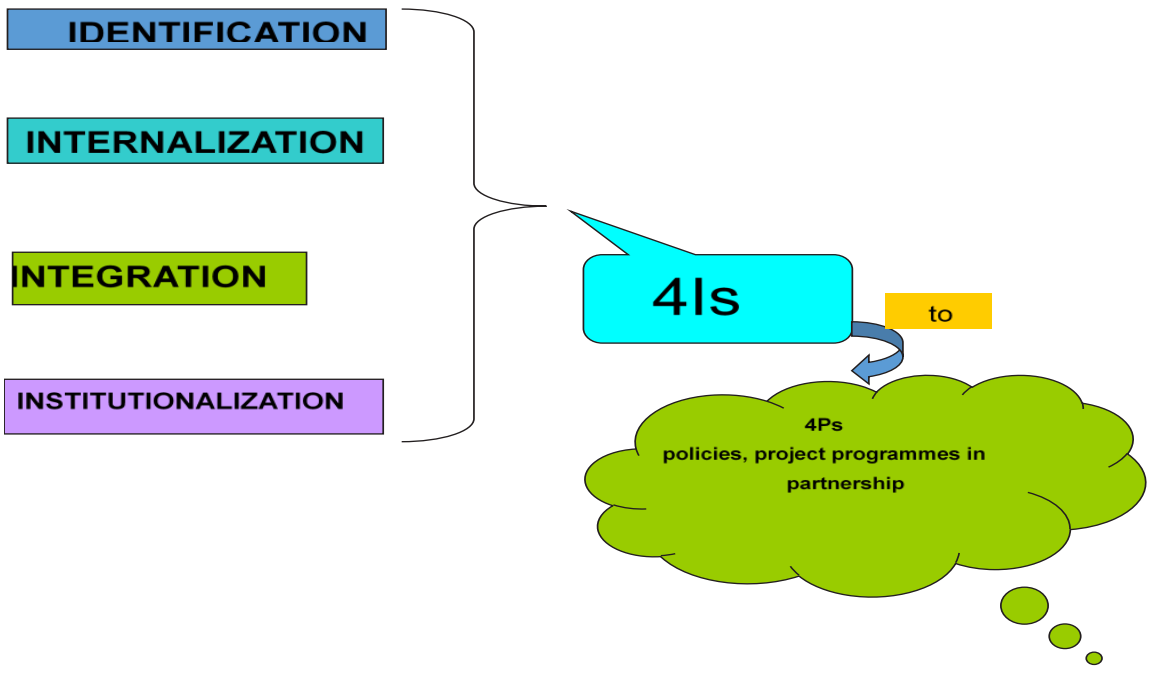


Figure: Gender, HIV and AIDS Mainstreaming Process

Issues that should be mainstreamed

Gender Issues
This usually involves identification of practical and strategic gender needs through the use of participatory tools. These needs usually revolve around four variables linked to gender equality and women's empowerment. These variables include:

- Division of labor between male and female.
- This looks at who between female and male farmers does what type of work, who is already overburdened with work, who is paid for what type of work to ensure that the concerns of all gender categories are addressed.
- Access to resources and benefits and opportunities.
- This looks involves conducting a gender analysis to look at who has access to what resources and where there are imbalances, developing actions where there are imbalances to achieve equality.
- Control of resources and benefits.

This involves developing strategies that empower vulnerable groups so that they have control over resources such as land for growing crops; choice of crops to grow; what farming systems to follow and how to use the income that accrues from the farming. In most households such decisions (related to strategic gender needs) are vested with men who are called heads of households.

- Participation in decision-making.
- This involves gender analysis to develop actions to promote equal participation of women and men in decision-making in agriculture activities at the household level as well as selection of women in decision-making positions in all institutions.

HIV and AIDS Issues
HIV and AIDS mainstreaming is a process that enables development actors to address the causes & effects of HIV and AIDS in an effective manner both through their usual work and through their workplace.
This entails placing HIV and AIDS at the center of the development agenda *or* as a process whereby HIV and AIDS actions becomes part of the normal & routine functions of an organization.

Mainstreaming HIV and AIDS entails addressing the following issues:

- Prevention and behavior change.
- This involves implementing activities that do not promote HIV infection and transmission amongst farmers, or agriculture staff.
- This can also include actions aimed at addressing unequal power relations between men and women that cause women and girls to have limited access to agricultural resources thereby putting them at the risk of HIV infection.
- Access to treatment care and support.
- Under this component the goal is to provide and expand treatment for People Living with HIV and mitigate the health and nutritional impacts of HIV and AIDS.
- Impact mitigation.
- This involves designing activities aimed at assisting those that are suffering from AIDS and also those that have been affected by the epidemic so that HIV and AIDS does not have negative effects on their lives. People targeted under this component include People Living with HIV, Orphans and Vulnerable Children, widows, widowers, caregivers, and the elderly.

Things to be considered when mainstreaming gender, HIV and AIDS:

- Always ensure that vulnerable people are targeted with intervention.
- Always ensure equal participation of women and other vulnerable farmers in all activities.
- Always ensure that men and women are equitably represented in decision making positions in farmer-based organizations committees.
- Always ensure that extension meetings are organized during times when women and other vulnerable categories can be able to participate.
- Always ensure collection and presentation of gender disaggregated data to capture how interventions are impacting on various gender categories.

Benefits of Gender and HIV mainstreaming?

Gender, HIV and AIDS mainstreaming assists in reducing gender disparities that exist among men, women, boys and girls in access to and control over agricultural resources and benefits.

- Promoting participation of all gender categories including the marginalized in agricultural development processes.
- Empowering the marginalized gender groups such as women, PLHIV, Child headed households through income generating and special projects.
- Reducing the impacts of gender disparities and AIDS on the project/program mandate and vice versa.
- Ensuring that programs or projects do not to perpetuate or introduce gender disparities or worsen vulnerability to HIV and AIDS.

Gross Margin Budgeting/Analysis

Gross margin refers to the remaining income from an enterprise after the variable costs are deducted (Gross income less Variable costs). It is usually calculated before production and after production on unit basis such as per hectare or per herd. Gross margin budget is a fairly detailed estimate of the output, cost, and profitability of individual crop and livestock enterprises. The gross margin budget includes all costs involved in producing the enterprise. It is not profit because it does not include fixed costs which the enterprise shares with other enterprises.

Importance of Gross Margin Budgeting/Analysis

- It helps farmers to compare the performance of a single enterprise using different farming practices and technologies.
- It is used to calculate potential profitability of growing an entirely new crop if a farmer wishes to diversify the products.

Steps for Gross Margin Calculation

- Determine an average yield per hectare for the enterprise.
- Determine the average farm gate price for the enterprise.
- Calculate the gross income per hectare (i.e. the average yield per hectare multiplied by the price at the farm gate.)
- Calculate the non-labour variable cash costs of inputs and materials per hectare for the enterprise. These should include the costs of seeds, fertilizer, pesticides, machinery services etc.
- Estimate the labour costs per hectare per activity for each enterprise (e.g. land preparation, sowing, weeding, harvesting, etc.).
- Calculate the total variable costs by summing the cost of inputs and materials and labour.
- Calculate the gross margin per hectare by subtracting variable costs from the gross income.
- Repeat steps 1 to 7 for each enterprise on the farm.
- Compare the gross margins among enterprises and determine which is or are more profitable.

Gross Margin for One Hectare of Maize Enterprise

Income		
Quantity (Kg)	Price (MK/Kg)	Value (MK)
5000	100	5000 x 100
Total Income		500,000
Variable costs		
Item		Total Cost (MK)
Seeds		20,000
23:21:0+4S		30,000
UREA		30,000
Land preparation		5,000
Ploughing		10,000
Ridging		15,000
Planting		5,000
Fertilizer Application		5,000
Weeding		15,000
Harvesting		20,000
Bagging		5,000
Total Variable Costs		160,000
Enterprise Gross Margin per Ha		(500,000-160,000) =340,000
Actual Ha		2
Gross Margin per actual Ha		(340,000x 2) = 680,000

Gross margin for a livestock enterprise

	ITEM	Kwacha	
	Closing value of animals at end of the year	300,000	
LESS:	Opening value of animals at beginning of the year	200,000	
EQUALS:	Increase in value of stock	100,000	(A)
	Income from sales of animals	100,000	
	Income from sales of by-products such as manure	50,000	
	Value of products used for home consumption	50,000	
EQUALS:	Value of sales and consumption	200,000	
LESS:	Purchases of animals of during the year	100,000	
EQUALS:	Net Sales	100,000	(B)
A + B	GROSS INCOME	200,000	
	Variable Costs		
	Drugs	15,000	
	Feeds	50,000	
	Veterinary Services	5,000	
	Labour	30,000	
	Total Variable Cost	100,000	
	Gross margin	(200,000-100,000) = 100,000	

Break-Even Budgeting/Analysis

Break-even budgeting is a technique for studying the relationship between costs and income at different levels of production and different prices. A break-even budget estimates the point at which farm's gross income is equal to its total variable costs. It looks at the level of the activity where no profit (gross margin) is made. The break-even can be determined for yield and market price.

Importance of Break-Even Budgeting/Analysis

- It gives an indication of maximum acceptable level of cost—the point at which, if costs increase, the farm will not be profitable.
- It also gives the minimum acceptable level of a benefit given an estimated level of cost—the point at which if income decrease, the farm will not be profitable.
- It helps the farmer make a plan when considering making a change in production (yield), inputs or mechanization costs or market price. For example, when the farmer wants to substitute one variety of maize for another.

Break-Even Calculation

- Determining the Break-Even Yield.
- Break-even yield (BY) is the yield required to recover all the costs incurred in production at given prices of the product and given input costs.
- Determining the Break-Even Price.
- Break-even price of the product is the product price needed to recover all variable costs incurred in production at a given output level and cost of input.

Cash Flow Budgeting

Cash flow is the flow of money into the farm from sales, loans and donation or gifts and the flow of money out of the farm through purchases and other payments. The difference between the cash inflows and cash outflows gives net cash flow. Net cash flow is calculated by subtracting the money (cash) spent over the year from the money received.

Importance of a Cash Flow Budget

- The farmer uses it to develop the farm plan.
- It helps farmers choose between alternative farm enterprises.
- It helps farmers to arrange for loans.
- It helps the farmer to assess the overall effect of the enterprise on the household finances.
- It helps to assess whether the family will have enough money to carry out their plan or if they will be short of money in any month.
- It enables the farmer to find the time of the year where additional financial resources may be required.

Steps for Constructing a Cash Flow Budget

The steps involved in preparing the Cash Flow are as follows:
Step 1: Identify Inflow and Outflow by listing income and expenditure items and when they occur in the year. For example, sale of maize in July, buying of fertilizer in October.
Step 2: Prepare a Cash Flow Table by entering all of the information in a Cash Flow chart which is shown at the end of steps.
Step 3: Calculate the monthly net Cash Flow by subtracting the expenses from the income for each month. It will be positive if income is greater than expenses; and negative if income is less than expenses.
Step 4: Calculate the cumulative net Cash Flow by adding the monthly net Cash Flow with the cumulative net Cash Flow of the previous month in order to assess whether the family have enough cash over the year to finance activities.
Step 5: Analyze the net Cash Flow to determine period (months) when the family has a shortfall or surplus of cash.

Example of a Cash flow Budget

MONEY COMING IN	Jan (K ,000)	Feb (K ,000)	Mar (K ,000)	Apr (K ,000)	May (K ,000)	Jun (K ,000)	Jul (K ,000)	Aug (K ,000)	Sep (K ,000)	Oct (K ,000)	Nov (K ,000)	Dec (K ,000)
Sales of farm products:												
Maize	250		300						300	100	100	
Cassava				340				120				
Milk			60	60	60	60	60	60	60			
Chicken	130								60			
Beans							450					400
Total Cash Inflow	380	0	360	400	60	60	510	180	420	100	100	400
MONEY GOING OUT	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Payments & Purchase of inputs:												
Maize inputs			300						300			
Cassava inputs				37								
Farm inputs livestock	30	50	50	50	50	50	50	50	50	30	30	30
Chicken feeding expenses									60			
Beans inputs				200	50		40			180		40
Household expenses:												
Living expenses	10	10	10	10	10	10	10	10	10	10	10	10
School fees		200			140				100			
Hospital Expenses	10	10	10	10	10	10	10	10	10	10	10	10
Total Cash Outflow	50	270	370	307	260	70	110	70	530	230	50	90
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Total Cash Inflow	380	0	360	400	60	60	510	180	420	100	100	400
Total Cash Outflow	50	270	370	307	260	70	110	70	530	230	50	90
Monthly Net Cash Flow	350	-270	-10	83	-200	-10	400	110	-110	-130	50	310
Cumulative balance	350	80	70	153	-47	-57	343	453	343	213	263	573

Farm Business Records

Farm records are financial and physical details involved in the course of operating a farming business. There are two types of farm records namely: physical records and financial records. Physical records are records of actual quantities in form of kg, meters, litres, hectares, tonnes and other units of measures other than money. Examples include farm map, crop and livestock enterprise record. Financial records are all the data information that is kept for keeping track of the money coming in and going out of the farming business. Examples include farm inventory, cashbook, sales book, purchase book.

Importance of keeping farm business records

- Provides the farmer with a history of what has happened on the farm between seasons and years.
- Helps to assess the physical and financial performance of an enterprise or the whole farm business.
- Establishes a basis for budgeting and planning changes in the farm business.
- Tells a farmer how much she is earning.
- Facilitates advisory services to farmers wishing to borrow money for investment, sales and marketing of agricultural products.
- Records aid the producer in obtaining greater net returns and/or making savings in operating the farming business than would have been possible without such records.

Sample crop enterprise record

Crop	Ha	Seed used	Fertilizer Used	Manure	Sprays	Yield

Sample record of home consumed farm produce

Date	Details	Eggs	Meats	G/nuts	Beans	Veg.

Sample sales and receipts (Incomes-In Section) record

Date	Details	Receipt No.	Amount	
			Cash	Bank

Sample Purchases and expenses (Expenditures-Out Section) record

Date	Details	Receipt No.	Amount	
			Cash	Bank

Sample sales book record

Date	Description	Cash	Credit	Total
3/2/2014	Vegetables	50	70	120
	Eggs	120	60	180
	Green maize	200	0	200
	Milk	250	400	650
	Total sales (daily)	620	530	1150

Market Research

Market research is the activity of collecting information about customers' needs and preferences concerning a specific product/service as well as information concerning the competition. It is the starting point for any production activity to determine what, where, how, why the product is in demand in order to prepare a production, processing, operations and marketing plan to respond to the perceived demand. Market research helps farmers to produce what they can sell rather than produce then hunt for a buyer.

Importance of Conducting Market Research

- It helps farmers to respond adequately to market demand or market requirements.
- Minimises marketing difficulties by producing what you can sell rather than sell what you have already produced.
- Helps to find out what products people want and reasons for their preferences.
- It assists accurate collection of information so that a reliable level of sales and production can be forecasted.
- Helps farmers prepare for possible changes – embark on mass production or change into a new product.
- It assists in establishment of good relations with potential customers or buyers.
- It assists in gathering relevant information or data for business plan write-up.

Steps for Conducting Market Research

Step 1: Farmers should develop a questionnaire or checklist of data they want to collect during market research.
Step 2: Farmers should discuss the questionnaire/checklist with fellow farmers and draw a visitation plan to the possible buyers of their products.
Step 3: Buyers should be written for booking in the visit / interview in advance.
Step 4: Conduct the survey to all possible buyers based on visitation and booking plan to collect data
Step 5: After conducting the market survey, farmers should analyze the survey results to choose markets or buyers which farmers can make contract with or get linked.
Step 6: Farmers should then decide whether to go on with their farm plan of producing for the possible identified buyers.

Example of Questionnaire for Conducting Market Survey

Kafukufuku wa Misika
Dzina la bungwe_____
Komwe bungwe lili (location)_____
Munthu wolumikizana naye pogulitsa katundu
Dzina la ogula_____
Udindo wake mu Bungwe_____
Lamya ya gula_____
Email ya ogula _____
Address ya ogula_____

Kodi katundu amene mumagula ndi ochuluka bwanji, nanga mumagula pa mtengo wanji ndipo mumagula mitundu yanji?

Mbeu	Mtundu (varieties)	Kuchuluka (kg)		Mitengo (mk)
		2012	2013	

Kodi katundu ameneyu mumagwiritsa ntchito yanji?

Katundu	Ntchito yake

Amene amakubweretselani katundu pakali pano ndi ndani?

Katundu	Dzina la Obweretsa katundu	Kuchuluka kwa katundu (kg)

Kodi ndi miyezi iti imene katundu amabwera wambiri nanga ndi miyezi iti yomwe amabwera ochepa?

MBEU	Miyezi Yomwe katundu amachuluka	Miyezi yomwe katundu amachepa

Kodi okubweretserani katundu ndi odalilika bwanji pa kachulukidwe ka katundu wawo, kaonekedwe kake (quality) ndi kalandiridwe ka ndalama

Dzina la Ogulitsa	Kudalilika pa Kachulukidwe	Kudalilika pa Kawonekedwe	Kudalilika pa kalandiridwe ka ndalama

Kodi malipiro kwa obweretsa katundu mumapereka patapita nthawi yaitali bwanji, nanga munjira yanji (cheque/cash)?

katundu	Nthawi yo pereka ndalama	Njira yoperekera ndalama

Kodi pali mbeu zina zimene mungazikonde zimene sizipezeka pakadali pano

MBEU	MTUNDU (varieties)	KUCHULUKA (kg)	MITENGO (Mk)

Kodi mungatigule mbeu zochuluka bwanji titati talima za quality yomwe mumafuna ndikuzigulitsa pa mtengo omwe mumagulila enawa?

Mbeu Zomwe zingagulidwe	Kuchuluka (kg)	Mtundu (varieties)	Mtengo (mk)

Analyzed Market Research Data

No	Org.	Crop	Variety	Qty	Price	Total amount	Delivery	Product availability	
1	Lilongwe Hotel	Tomato							
2	Mzuzu Hospital	Maize							

Farm Business Plan

A farm business plan is a plan that records the most important decisions and actions affecting the operation of the farm business. It is a way to make sure that all the things that need to be done are done in a way that makes the farm more profitable. A farm business plan can be very simple or very complex.

Components of Farm Business Plan

1. Background—Describes farm business, objectives of farm business, vision and goal of farm business.
2. Farm Production Plan—States the number and types of farm enterprises (crops, livestock), and the size of each farm enterprise.
3. Technical Feasibility—States or checks if it is possible to produce the proposed farm enterprises based on rainfall, temperature, soil, water availability, grazing land etc.
4. Physical Resources and Inputs—Describes the resources and inputs needed such as capital, inputs and materials, quantity need and available and sources of supply.
5. Labour Requirements—Describes the quantity of labour required and available to carry out farming activities. State also when and where the needed labour will be sourced.
6. Market plan—States where (buyers and place) you will sell the products, selling price, packaging and transport arrangement.

7. Profitability—States enterprise gross income (quantity x price), enterprise variable costs, gross margin and fixed costs to determine farm profit.
8. Cash availability—Describes how much cash is needed and available to finance farm activities. Describe also the flow of cash over the months and the sources of cash.
9. Risks—States possible farm business risks and how farmers will handle them.
10. Notes—Include any other information farmers may require to record such as where to get some technical assistance.

Simple Farm Business Plan Template

Background

Name	Village/District	Period of Farm Business Plan e.g., 2014/2015 Farming Season

Vision

Goal

Farm Production Plan

Crop Type	Area(ha)	Output (Kg/ha)	Total output (Kg)

Milk Production

Type of animal	Number of animals	Litres per animal	Total litres

Technical Feasibility

Technical Production Factors	Okay/Not okay	Notes

Physical Resources and Inputs

Resources/Inputs	Quantity	Source of supply

Labour Requirements and Availability

Enterprise Activity	Month	Total labour required to do the activity	Amount of labour to hire
E.g. Land preparation			
Total			

Market Plan

Target market	Expected quantity to sell	Marketing Costs (MK)	Expected Price (MK)
E.g. Mzuzu Central Hospital or ADMARC			

Profitability

Enterprise: _____

Income

Product	Quantity	Price per unit (MK)	Total Value (MK)
Total Expected Income			

Variable Costs

Resource/Inputs/labour	Quantity needed	Cost per unit (MK)	Total Costs(MK)
Expected Enterprise Profit			

Enterprise: _____

Income

Product	Quantity	Price per unit ($)	Total Value ($)
Total Expected Income			

Variable Costs

Resource/Inputs/labour	Quantity needed	Cost per unit ($)	Total Costs($)
Expected Enterprise Profit			

Whole Farm Profit

	Enterprise 1	Enterprise 2	Total Expected Enterprise Profit
Expected Enterprise Profit			
Less Fixed Costs			
Total Fixed Costs			
Whole Farm Profit			

Cash Availability

Cash needed	Cash Available	Source

Cash Inflow and Outflows

	Month 1	Month 2	Month 3	Month 4	Month 6	Month 7	Total
Cash Inflow							
Total Cash Available							
Cash going out/expenses							
Total cash going out							
Net Cash Flow							
Cumulative Cash flow							

Risks

Risks	How to handle the risk

Notes:

Acknowledgements

The production of this resource material has been a result of collaborative effort by many subject matter specialists from the various departments under the Ministry of Agriculture Irrigation and Water Development. The team is indebted to all officers who unselfishly provided information when asked.

A number of publications were consulted to come up with this content and are listed below:

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2017 Calendar

January

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

February

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28				

March

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

April

S	M	T	W	T	F	S
30						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

May

S	M	T	W	T	F	S
30	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

June

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

July

S	M	T	W	T	F	S
30	31					1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

August

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

September

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

October

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

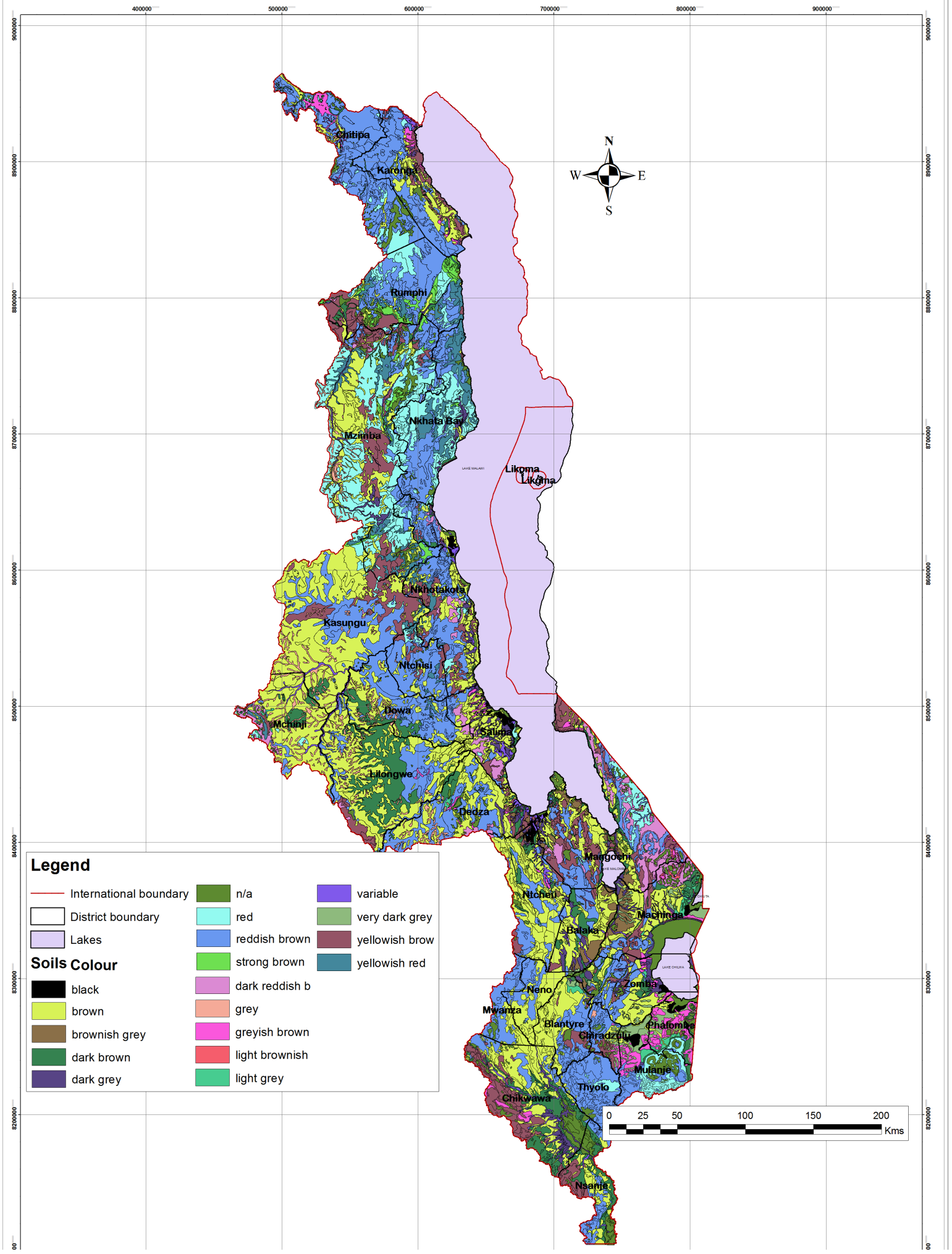
November

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

December

S	M	T	W	T	F	S
31					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MALAWI SOILS



Legend

- International boundary
- District boundary
- Lakes

Soils Colour

- black
- brown
- brownish grey
- dark brown
- dark grey
- n/a
- red
- reddish brown
- strong brown
- dark reddish b
- grey
- greyish brown
- light brownish
- light grey
- variable
- very dark grey
- yellowish brow
- yellowish red

MALAWI LAND USE AND ELEVATION