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Government of Malawi



Republic of Mozambique



Government of Republic of Zambia

# Maize Based R&D Efforts

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Centre of Leadership (CoL) in Maize Based Research

# Groups of technologies based on thematic areas:

- A) Breeding (Maize varieties/ inbred lines) ~ 7 sub projects
- B) Agronomic practices ~ 5 sub projects
- C) Post-harvest and food safety technologies ~3 subprojects
- D) Plant protection ~ 2 sub projects
- E) Dissemination of maize varieties and labour saving technologies ~ 3 Sub projects

Total 18 Sub projects (30 slides)

# Group A: Maize varieties/ inbred lines

## 1.0 Improving nutritional quality in maize in Mozambique, Zambia and Malawi

Maize varieties biofortified with vitamin A and Quality protein were evaluated in Mozambique, Zambia and Malawi

- Two QPM hybrids released in Zambia **GV 682P, GV 687P**
- Five vitamin A maize hybrids released in Malawi MH45A, MH46A, MH47A, MH48A and MH49A,
- **Six vitamin A hybrids released in Zambia: GV6023A, GV6025A, GV6027A, GV6029A, and GV6017A**
- Two QPM hybrids in the pipe line in Malawi,
- **QPMMZ07 & 1 Provitamin A (PROVMZ01) and MH45A, MH46A) selected in Mozambique identified for release in Mozambique**



## 2.0 Screening and promotion of Striga resistant/tolerant maize varieties in Malawi, Mozambique and Zambia

Striga (witch weed) tolerant maize hybrids evaluated in Malawi, Mozambique and Zambia :

Three hybrids released in Malawi: MH51STR, MH50STR and MH52STR.

In Zambia hybrids (M1512-14, M1512-12, M1512-10, M1512-13, M1512-5) and OPV's (M1509-9, M1509-2, M1509-3, M1509-4, M1509-10) were evaluated in Eastern Province

## 3.0 Development of maize varieties resistant to major diseases.

Donor inbred lines for tolerance to common fungal diseases and Maize Lethal Necrosis were developed and evaluated in Malawi:

Five hybrids were released:

MH53, MH54, M55, MH56MLN and MH57MLN



4.0 Development of maize varieties tolerant to drought and heat by use of double haploid technology as a mitigation to **climate change** in Malawi, Mozambique, Zambia and Angola.

Donor inbred lines for tolerance to heat and drought were used in development of both hybrids and inbred lines

Achievements to date:

Drought and heat tolerant hybrids released in Zambia

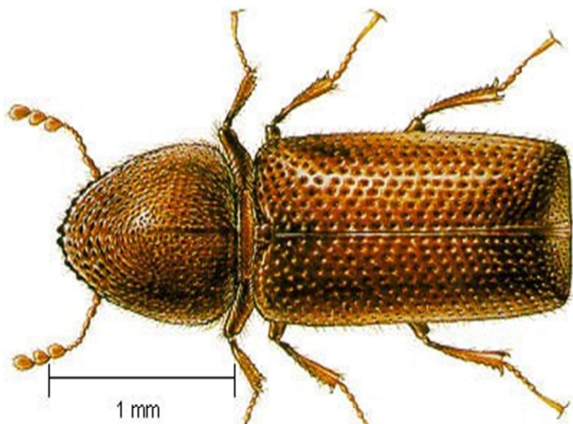
GV6002 and GV6008

Malawi generated 1,200 DH lines



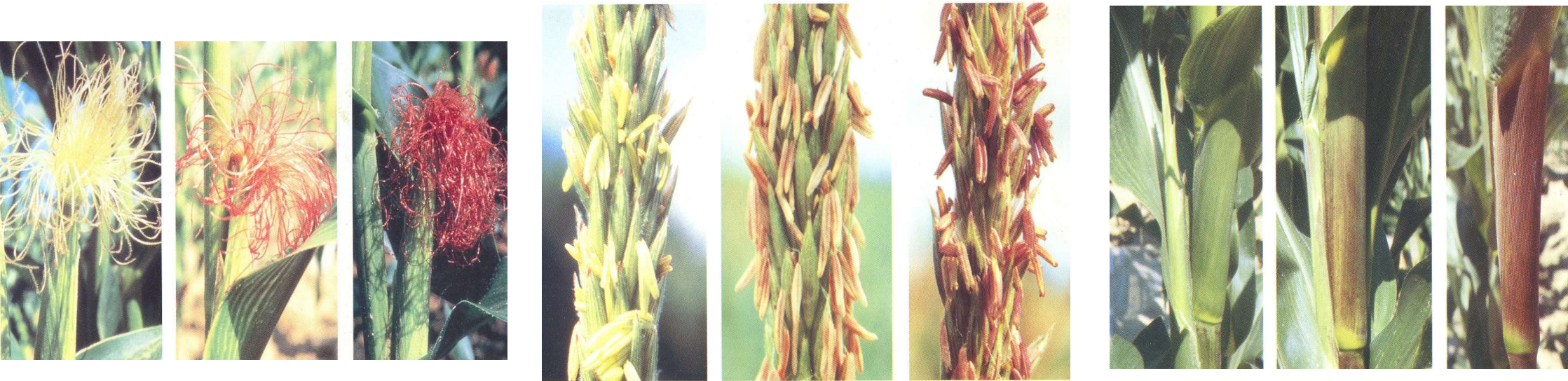
## 5.0 Development and improvement of inbred lines tolerant to major storage pests

Donor inbred lines for tolerance to common maize weevil and Larger grain borer from Insect Resistant Maize for Africa- CIMMYT Project (IRMA) were used in generating source population for inbred lines extraction : **In Malawi 67 S3 lines were selected for advancing to S4**  
**In Zambia : ZARISB1712, ZARISB1709 are in NVPT at SCCI**



## 6. ESTABLISHING CORE CORRECTION OF REFERENCE VARIETIES AND DROUGHT TOLERANCE THRESHOLD FOR MAIZE TO PROMOTE SADC SEED TRADE (MZ-MZ-P17-2016)

- Establish reference varieties for traits in maize DUS testing.
- Characterize drought tolerant maize using both molecular markers and morphological traits.
- Morphological started in Malawi. Not yet on molecular





## 7.0 Maize germplasm collection & characterization for climate change adaptation

- 800 maize samples collected (500MW, 150MZ,150ZM).
- At least 400 samples duplicated with SADC Gene bank



## Group B: Agronomic practices:

### 1.0 Enhancing Drought Resilience in Rain-fed Maize and Upland Rice Using Silicon Based Fertilizer



Untreated maize after 14 days dry spell



Si treated maize after 14 day dry spell

In Malawi Extraction of silicon and identification of better method done and Field trials not done

## 2.IMPROVING WATER USE EFFICIENCY IN MAIZE PRODUCTION

***One Technology Released in Malawi:***  
***Alternate Furrow Irrigation technique is***  
***one of the Climate Smart Irrigation***  
***Technique as it saves labour, time water***  
***whilst reducing conflict for water among***  
***farmers.***

***It is a promising strategy for reducing***  
***irrigation water in irrigation schemes.***



### 3. Improvement of crop-dairy integrated production systems



- Identifying legumes forages and dairy breeds compatible **with maize based production systems**
- Key implementing partners
  - LUANAR Coordination and conducting trials in MW
  - GART ~ Conducting trials in Zambia
    - UNZA ~ Supply legume material in Zambia
    - ZARI ~ Coordination and supply of maize seed in Zambia
- Technical backstopping partner
  - SRUC (Dairy Research Centre) ~ Technical advise on dairy experiment
- **Graduation of one BSc student supported by the project**



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# 4. Developing conservation agriculture maize-legume systems for smallholder farmers in Mozambique, Malawi and Zambia

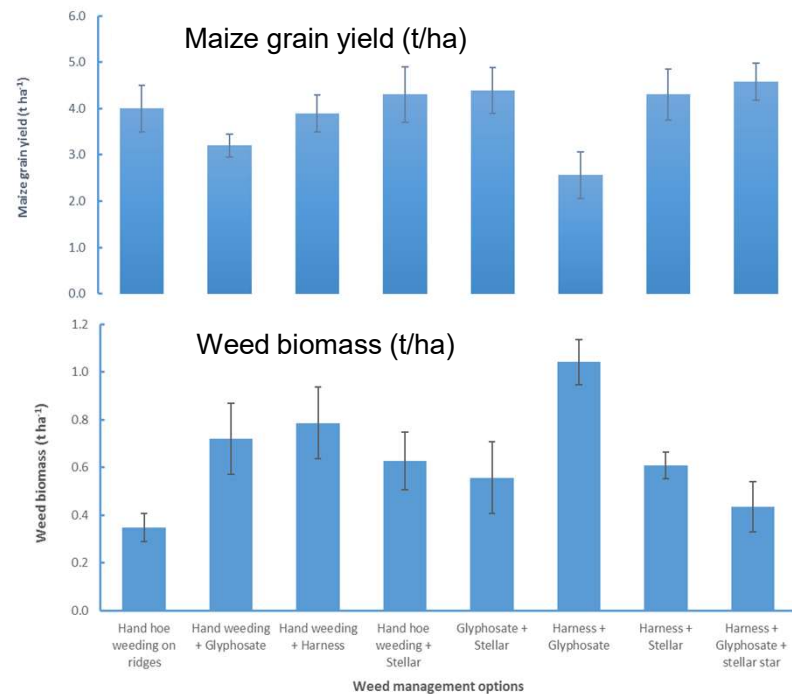
- ❖ To document maize and legume production constraints and opportunities to introduce legumes in maize based systems in Malawi, Mozambique and Zambia;
- ❖ To develop and validate best CA practices that will reduce risk in smallholder farming systems
- ❖ Activities not completed.

## 5a. Understanding farmer circumstances on herbicide weed control and performance among smallholder farmers practicing conservation agriculture in Malawi Mozambique and Zambia

To assess determinants on uptake of herbicides among smallholder farmers in CA maize based farming systems in selected regions of Malawi, Mozambique and Zambia.

This project after implementing for a year was modified in Malawi because it didn't have a clear expected out put to benefit the subsistence farmer or the farming.

## 5b) Improving herbicide weed control in conservation agriculture maize based cropping systems among smallholder farmers in Malawi.



### Achievements.

- High yields are attainable with the combination of Glyphosate with Harness/Stella Star applications.
- Combining of hand weeding and Stella Star applications can improve yield & weed control.
- Triple combinations of Stella Star, Harness and Glyphosate can improve yield and weed control THAN Harness + Glyphosate



## Group C: Post-harvest and food safety technologies

### 1.0 Assessment of Solar Drying for Reducing Post-Harvest Losses in Maize ”



#### Specific Objectives

- 1) Adapt solar tunnel dryers for maize in the selected areas;
- 2) Fabricate the adapted solar tunnel dryers for maize in the selected areas;
- 3) Assess the performance of the solar tunnel dryers as relative to conventional direct sun drying;
- 4) Assess the effect of solar drying on the prevalence of mycotoxins in maize; and;
- 5) Evaluate the economic feasibility of the solar tunnel solar drying technology for maize in the selected areas.





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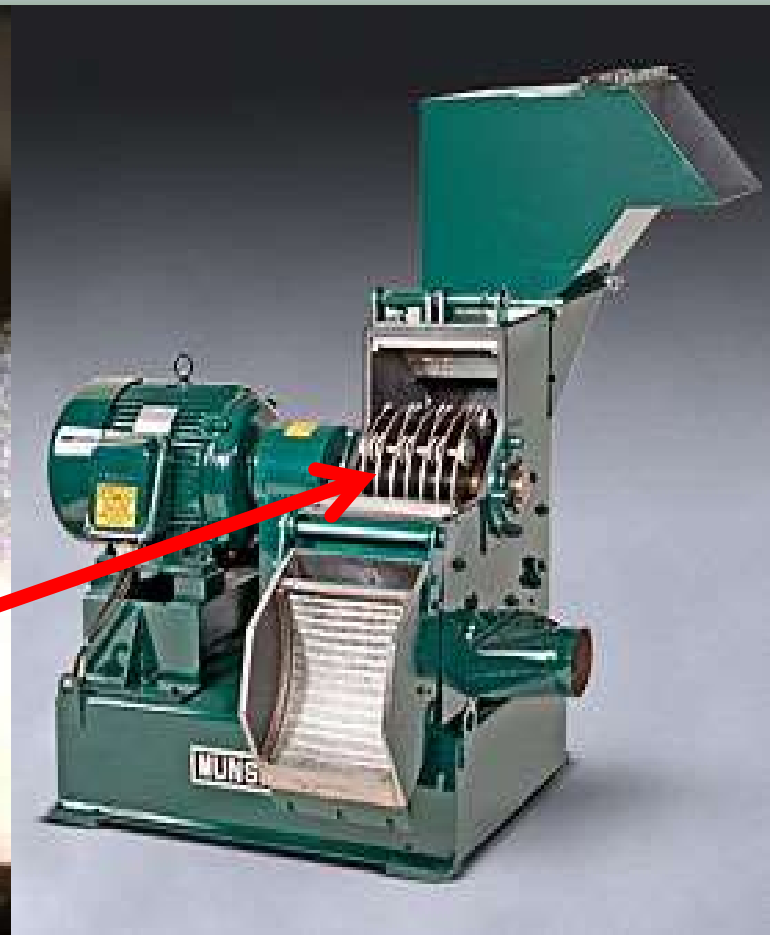


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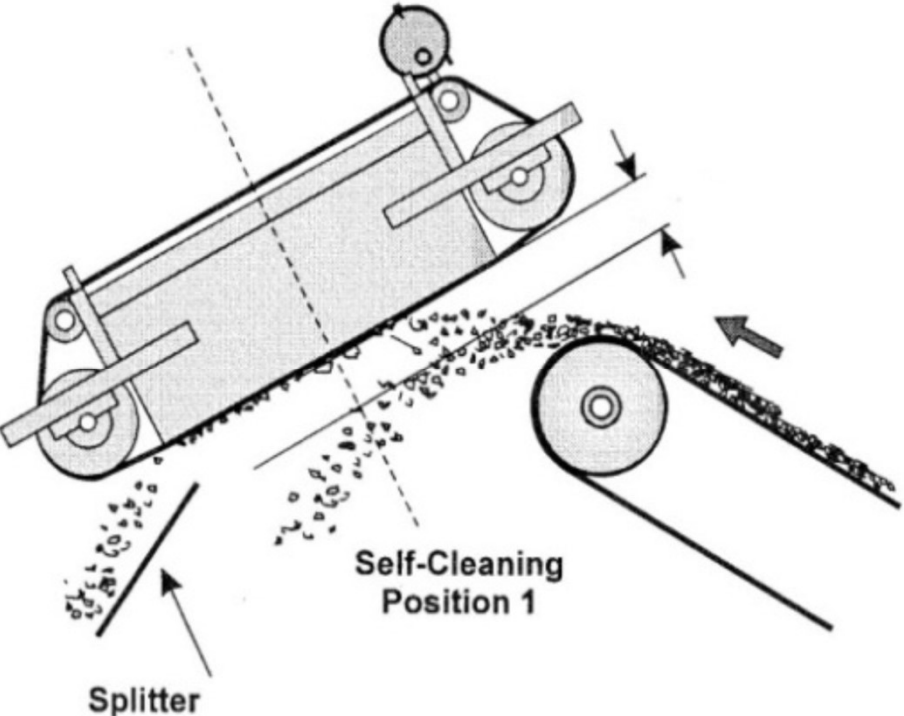
## *2.0 Investigation and quantification for metal-contamination in hammer-milled maize flour for the re-design and modification of maize mills for safe flour in Malawi, Zambia and Mozambique.*

**Findings:** There is significant heavy metal content in hammer-milled maize /grain flour. These heavy metal contaminants would be toxic and health-hazard to humans if not urgently addressed.

# Sources of metal contamination



Proposed modification to reduce contamination of flour:



Magnetic separator and metal detector in line with conveyor belt

# 3.Improvement of some postharvest management practices in maize

1. To review improved crop postharvest technologies, test and validate with farmers, extension staff and traders/processors
2. To build capacity of MoA staff, farmers, and NGOs in postharvest management of grain and estimating maize postharvest losses (cereals and legumes)
3. To ensure safe, high quality and market-attractive maize flour for human consumption



Some work was done on metal silos and pics bags



## Group D: Plant protection - fall armyworm control in maize:



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Ministry of Agriculture, Irrigation  
and  
Water Development

# 1. PROGRESS OF THE FALL ARMYWORM RESEARCH PROJECT AT THE DEPARTMENT OF AGRICULTURAL RESEARCH SERVICES (DARS)



Snowcron 500 EC, Snowmectin 1.6 EC and Nimbecidine have been evaluated **for three seasons, they are candidates for official release**

Dettamax 25 EC, Mimic 20 SC and Ecoterex 0.5GR are also promising candidates for official release once investigation is completed



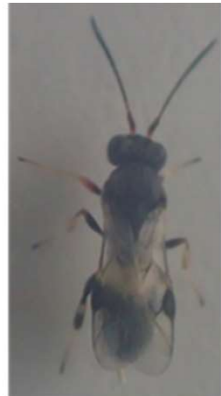
Suspected Mermithid nematode: Parasite of the FAW

## Biological control of FAW

Identification of FAW parasitoids...



*Parapanteles* sp



*Chelonus* sp



*Pristomerus* sp



*Charops* sp



*Coccygidium* sp

**FAW parasitoids identified in 2017/2018 season, also obtained in 2018/2019 season**

## 2. Disease and Pest Challenges in Maize Production under Conservation Agriculture Cropping Systems; What do we learn?



### Expectation

- Enhanced knowledge of maize varieties that are compatible with CA cropping systems in different agro-ecological zones.
- Enhanced knowledge on the diseases and pests of economic importance under CA and their control measures

## e) Dissemination

### 1. Dissemination of improved maize varieties and agronomic practices among smallholder farmers

- Number of field days conducted 56
- Number of radio programs featured 4







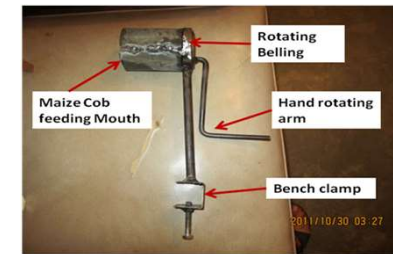
## 2. MZ-P14-2016



# 2. Popularising hand tools for maize planting, fertilizer application and shelling for smallholder farmers in Malawi, Mozambique, Angola and Zambia



seed planter & fertilizer applicator



Hand maize sheller

## Expectations:

At least 2 simple modern multipurpose hand tool tested in at least **3 different agro-ecological zones**

At least 2000 hand tools produced and distributed to over 2000 Malawian and Zambia smallholder farmers.

### 3) Fertilizer applicator – Labour saving technology



## LESSONS

- Some Technologies are responsive to climate change.
- Some sub projects require enhancement of multidisciplinary approach.
- Some sub projects are highly responsive to emerging issues eg FAW, Climate change.
- Science has the potential to solve crop production problems, food safety, human nutrition, food security etc.

# Challenges

- Resources were not made available according to the approved budget that led to non completion of some research projects.
- Inadequate time and resources for concept note and main proposal write up

# Way forward

- Prioritization when approving sub projects by Scrutinizing expected out puts “ Project Title: **Understanding farmer circumstances on herbicide weed control and performance among smallholder farmers practicing conservation agriculture in Malawi Mozambique and Zambia**”
- Each project component : Technology generation, capacity building, infrastructure etc should have a clear budget to avoid vialement of resources that interferes implementation of other components.

# AKNOWLEDGEMENTS



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