

**DISTRIBUTION, CHARACTERISATION
AND CONTROL OF COWPEA MILD
MOTTLE VIRUS INFECTING COWPEA
AND GROUNDNUT IN WESTERN
KENYA**

MARIAM NYONGESA WERE

COWPEA

- Cowpea, *Vigna unguiculata* (L) Walp, and groundnut (*Arachis hypogaea*) are among the most important food legume crops in the tropics
- They are **drought-tolerant** and warm-weather crops.
- Useful ability to fix atmospheric nitrogen and they grow well in **poor soils**

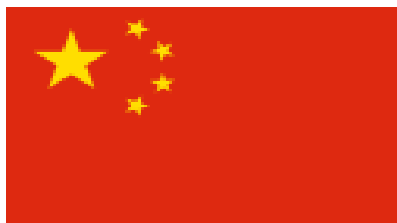
USES



USES CONT'D

- Production of peanut oil
- Protein cake residue used as animal feed and soil fertilizer
- making soap and other cosmetic products
- Shell used in manufacture of abrasives, paper, mucilage (glue)
- Manufacture of industrial end products like varnish, lubricating oil, insecticides
- Cowpea is mainly grown for its leaves and seeds

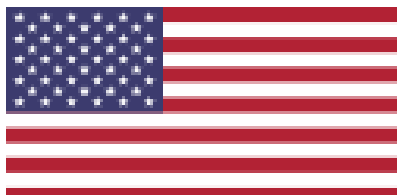
TOP WORLD PRODUCERS 2012 IN M.METRIC TONNES



PEOPLES REPUBLIC OF CHINA 16.7



INDIA 5.0



UNITED STATES OF AMERICA 3.1



NIGERIA 3.1



KENYA *0.025

PRODUCTION CONT'D

- In Kenya yield are estimated at 1.6 ton/ha and 1.27 ton /ha for cowpea and groundnuts respectively.
- In western kenya, the yields obtained are 0.53 and 0.025 ton/ha respectively
- The low yields are blamed on poor agronomic practices, pests and diseases among other constraints

DISEASES AND PESTS OF COWPEA&G.NUTS

COWPEA	GNUT
CABMD	Rosette
BCMD	G.nut blight
Peanut stunt disease	leafspot
CPMMD	CPMMD
Cucumber Mosaic disease	Rust
Aphids	Thrips
Leaf miners	catterpillars

COWPEA MILD MOTTLE DISEASE(CPMMD)

- CPPMD is caused by CPMMV which is in the genus *Carlavirus* and family *Betaflexiviridae*
- Its transmitted by whiteflies (*Bemisia tabaci*)
- It is also seed-borne in some cultivars of cowpea and soybean
- Several strains of the virus have been reported
- The disease has a very extensive geographical distribution with a wide host range

CPMMD SYMPTOMS



CPMMD CONT'D

- CPMMV is reported as an economically important virus in E.Uganda where it has been ranked as the 2nd in terms of economic importance
- Yield losses of up to 87% due to infection by the virus have been reported in cowpea in Nigeria
- Despite the threat to food security in the region , no work has been done to determine the status of the virus in western Kenya

OBJECTIVES

- To determine the occurrence and distribution of CPMMD in Western Kenya
- To characterize the virus causing the disease in western Kenya
- To develop diagnostic tools for CPMMV
- To evaluate the effect of legume species integration and intercropping with maize within an AEZ and the effect of inter and intra-specific legume diversity on CPMMD pressure

MATERIALS AND METHODS

- Disease incidence will be determined
- Symptomatic leaf samples will be collected for subsequent virus diagnosis and analysis.
- Total RNA will be extracted from CPMMD infected plants following the RNeasy Plant Mini Kit (Qiagen, Hilder, Germany)

METHODS CONT'D

- RNA-seq procedure will be used for sequencing
- Sequence reads will be mapped against a reference genome

METHODS CONT'D

- Information obtained in objectives i and ii, will be used to design serological and molecular tools for the detection, differentiation and development of differential PCR tests for the CPMMV strains.
- Cowpea and groundnut farms in neighbouring fields will be used as controls to assess the effect of intercropping on disease pressure

Results

Symptoms observed in cowpea farms



Leaf mottling and deformation



Severe chlorotic blotches



Veinal Chlorosis



Severe mosaic

Results cont'

CPMMD symptoms observed in groundnuts farms



A- Downward leaf rolling and chlorotic lesions,

B- Dwarfing, leaf deformation and mottling

CPMMD INCIDENCE IN G.NUT

REGION	5 weeks	7 weeks	9 WEEKS
MADOLA A	1.6	45.5	67
MADOLA B	4.6	41.8	58
SIKARIRA	13.5	34.6	37.8
BUJUMBA	22.5	35	41.8
ALUPE	25.7	53.14	69.9

CPMMD INCIDENCE IN COWPEA

REGION	5 WEEKS	7WEEKS	9 WEEKS
MADOLA A	1.6	25	18
MADOLA B	8	14.4	25
SIKARIRA	12	18	25
BUJUMBA	22.5	33	42
ALUPE	13.6	24	58

COMPARISON OF INCIDENCE IN PURE AND INTERCROPPED FIELDS

		COWPEA		GROUNDNUT
REGION	PURE	INTERCROP	PURE	INTERCROP
MADOLA A	58	14.7	63	38
MADOLA B	42	15.8	58	34.8
SIKARIRA	33.5	18.3	42	28.6
BUJUMBA	22.5	32.5	58	32.8
ALUPE	83	31.8	75.56	49.58
MEAN	47.8	22.6	59.312	36.756

DISCUSSION

- Based on symptoms observed in the field
 - CPMMD incidence is highest at Alupe
 - there is higher incidence of CPMMD in pure crop stands than in intercropped fields
 - The disease incidence is higher in groundnuts than in cowpea

WHAT NEXT

- Serological analysis
- Sequencing
- Development of diagnostic tools
- Development of management strategies

THANK YOU