Assessing Virus Degeneration of Clean Sweetpotato Planting Materials Multiplied in Insect-proof Net Tunnels under Farmer Management

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6TH Annual SPHI Technical Meeting
Sept 28 – Oct 2, 2015
Kigali, Rwanda

Sweetpotato farmers incur up to 98% losses due to SPVD

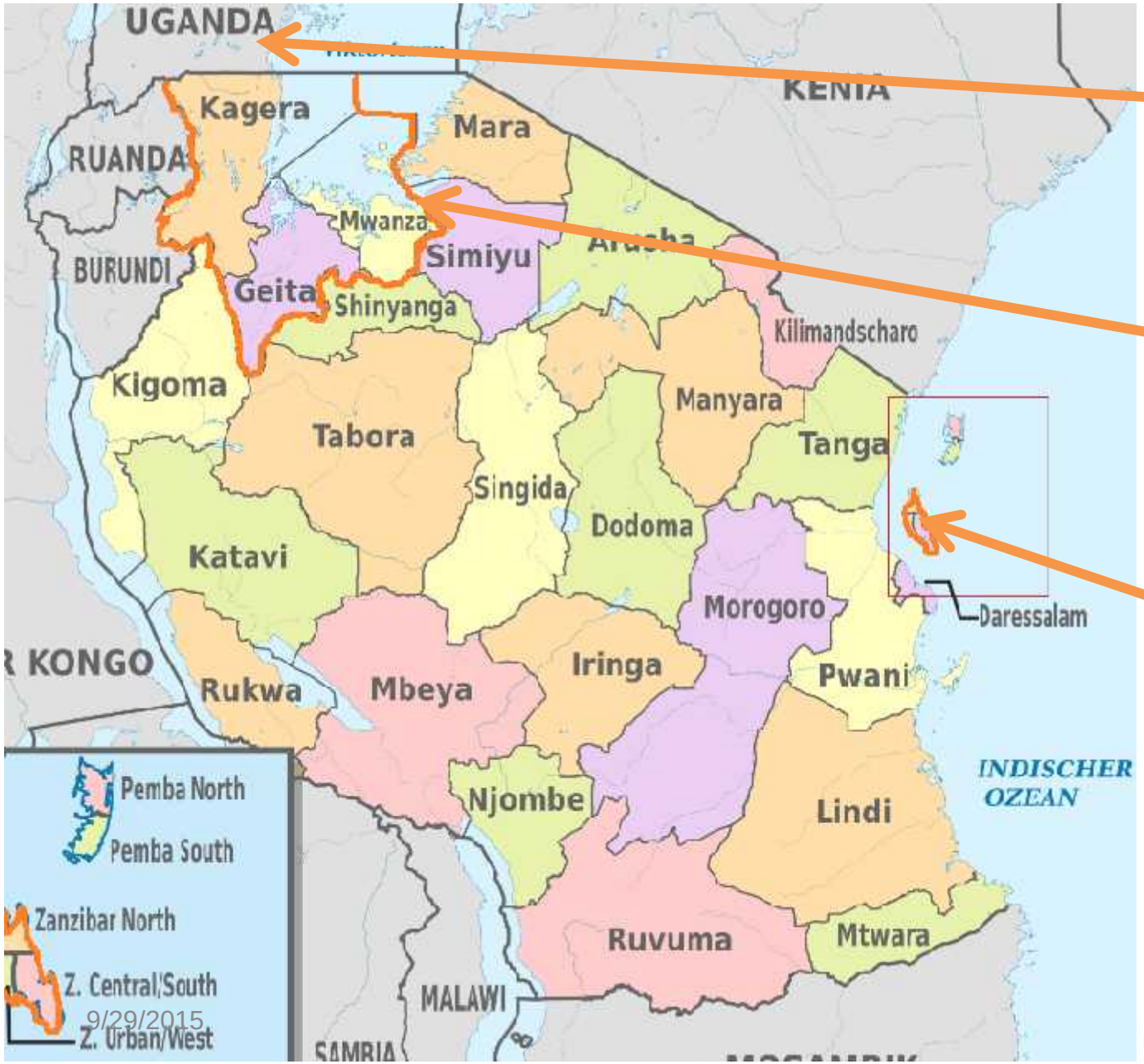
Kinga Marando Project

- **Kinga Marando project is piloting the use of of low cost net tunnels to help protect vines from whiteflies and aphids, the disease vectors.**

- **CIP is a sub-grantee in the project led by LZARDI.**

KINGA MARANDO
PROTECTING VINES

Study is part of Kinga Marando project being implemented in Uganda and Tanzania



Uganda

Lz: Kagera, Mwanza & Geita Regions

Zanzibar: Unguja

Objective

- **Seeks to determine the rate of virus degeneration in sweetpotato planting material multiplied under net tunnels compared to planting material multiplied in open fields over a period of two years under farmer multiplier management.**

- **Allows comparison between:**
  - **Susceptible (Kabode) and less susceptible (Polista) varieties**
  - **high virus (Mwasonge) and low virus pressure (Nyasenga) areas**
  - **sprayed tunnels and open field multiplication**

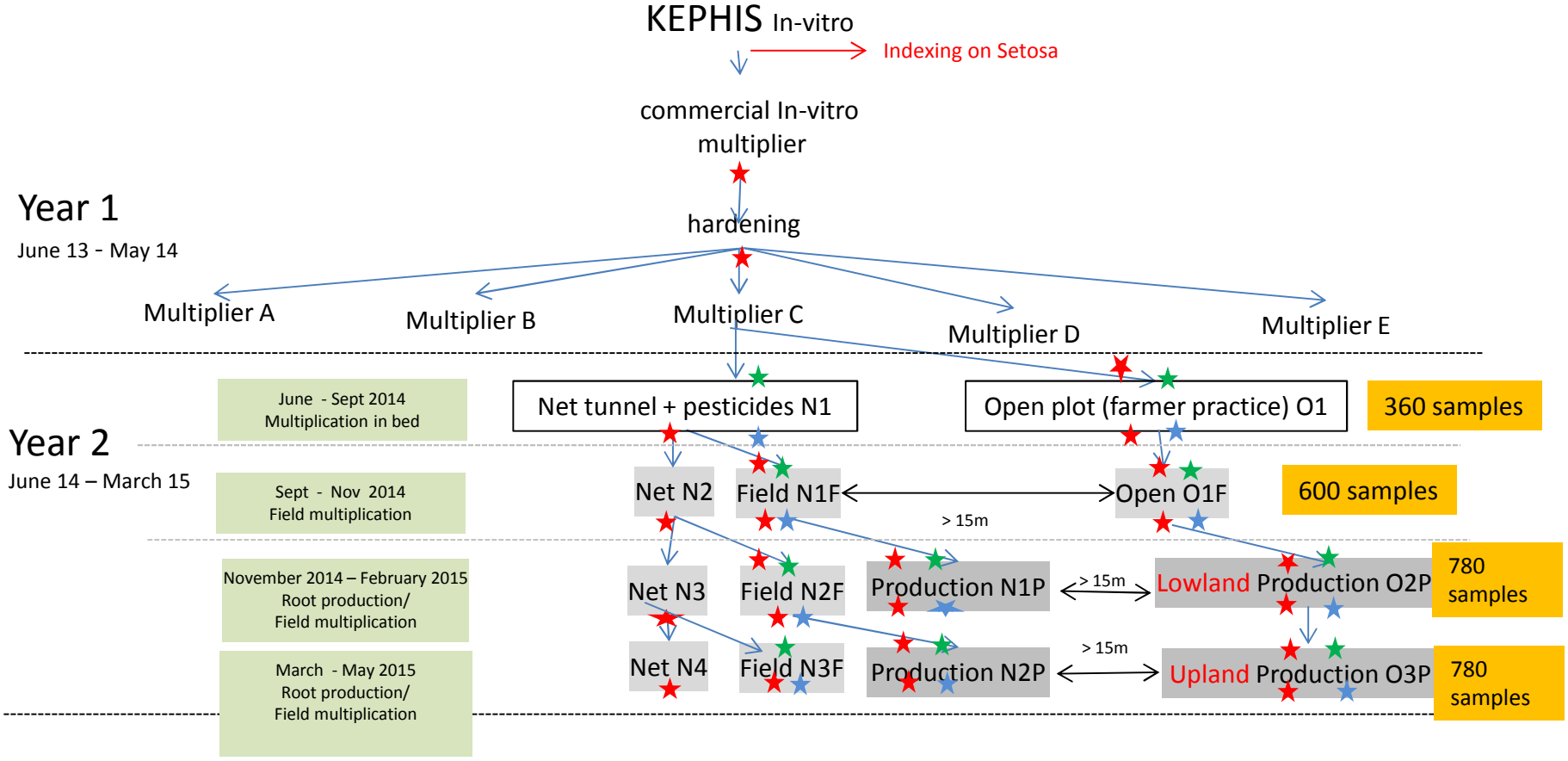
Mwasonge (high virus pressure area)
2º 40´ 13´´ S
32º 54´ 45´´E

Nyasenga (low virus pressure area)
2º 39´ 40.1´´ S 32º 44´ 30.6´´E

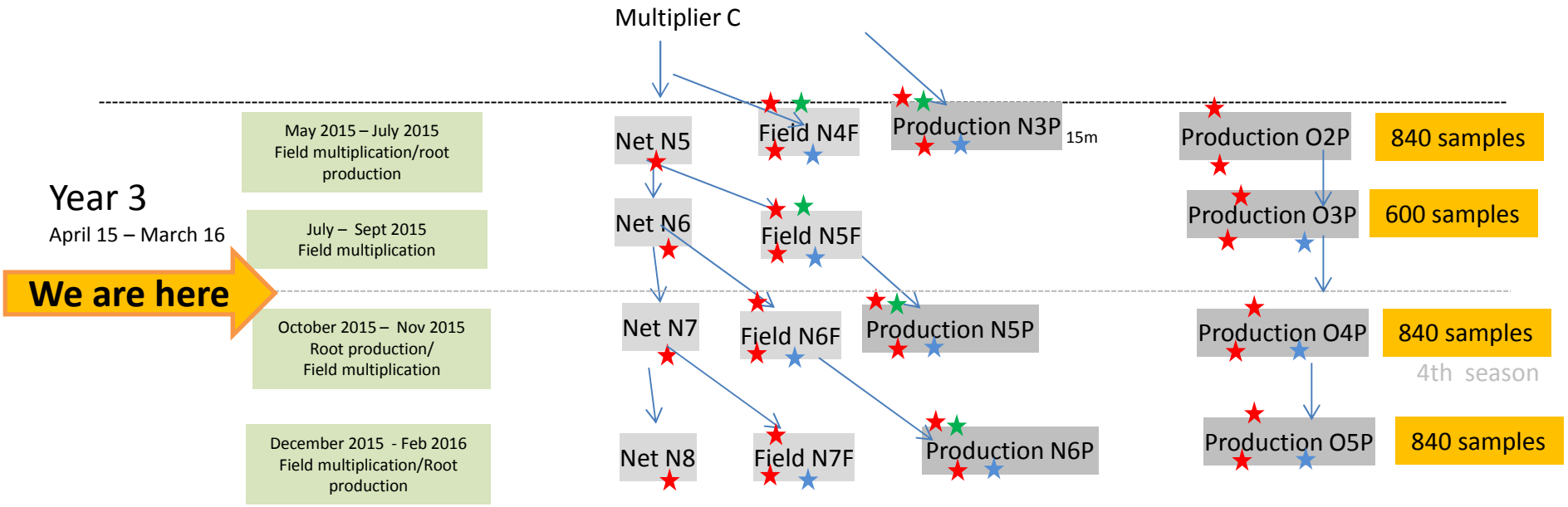
- **2 Net tunnels and 2 open beds established per site in June 2014: Kabode and Polista varieties**
- **Initial isolation distance between net tunnels and open beds was 1m; from SP plants it was 15m. An isolation distance of 15m was maintained during field multiplication; maize planted as barrier crop**
- **10cm X 20cm spacing for both establishment and multiplication**

VDS site in Mwasonge village
Date: 18/8/2014
Photo credit: K.Ogero

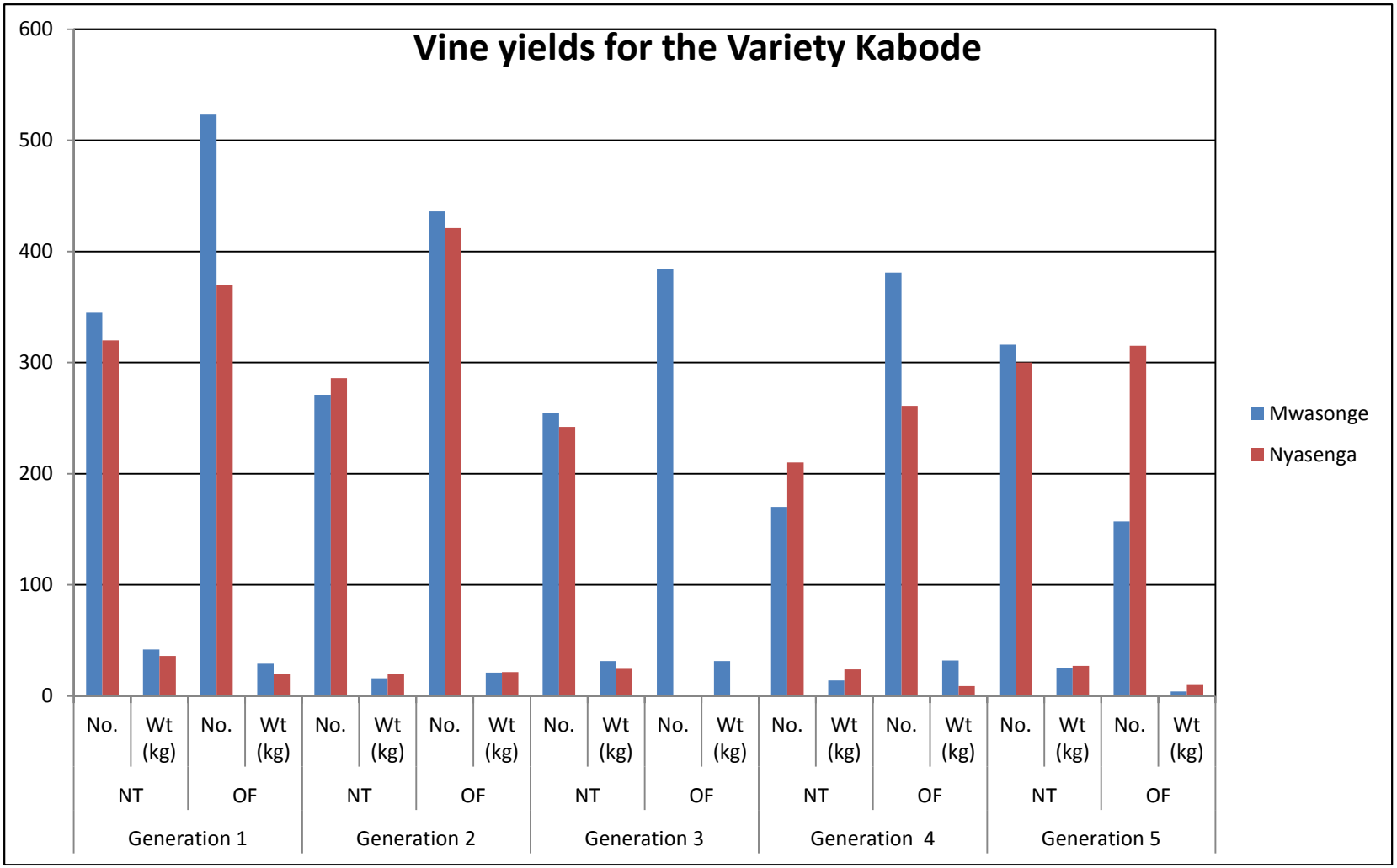
- **Vines harvested after every 60-80 days and vine yield calculated**
- **Leaf samples also collected and sent to the laboratory for virus testing through PCR**

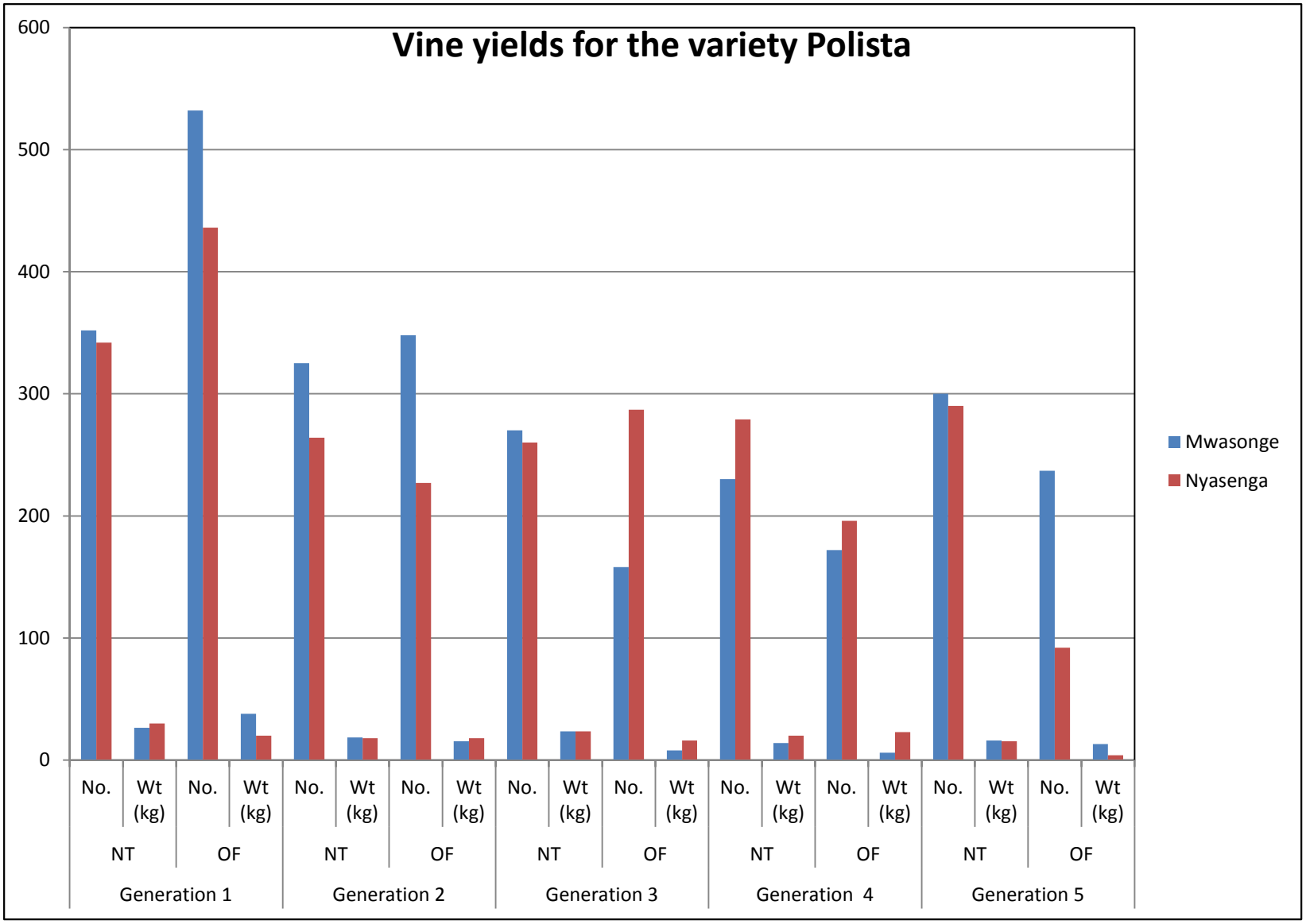


- **A visual assessment of virus symptoms and whitefly count done once in each field generation**
- **Weather data (Rainfall, RH and Temp) recorded using Onset® data loggers**

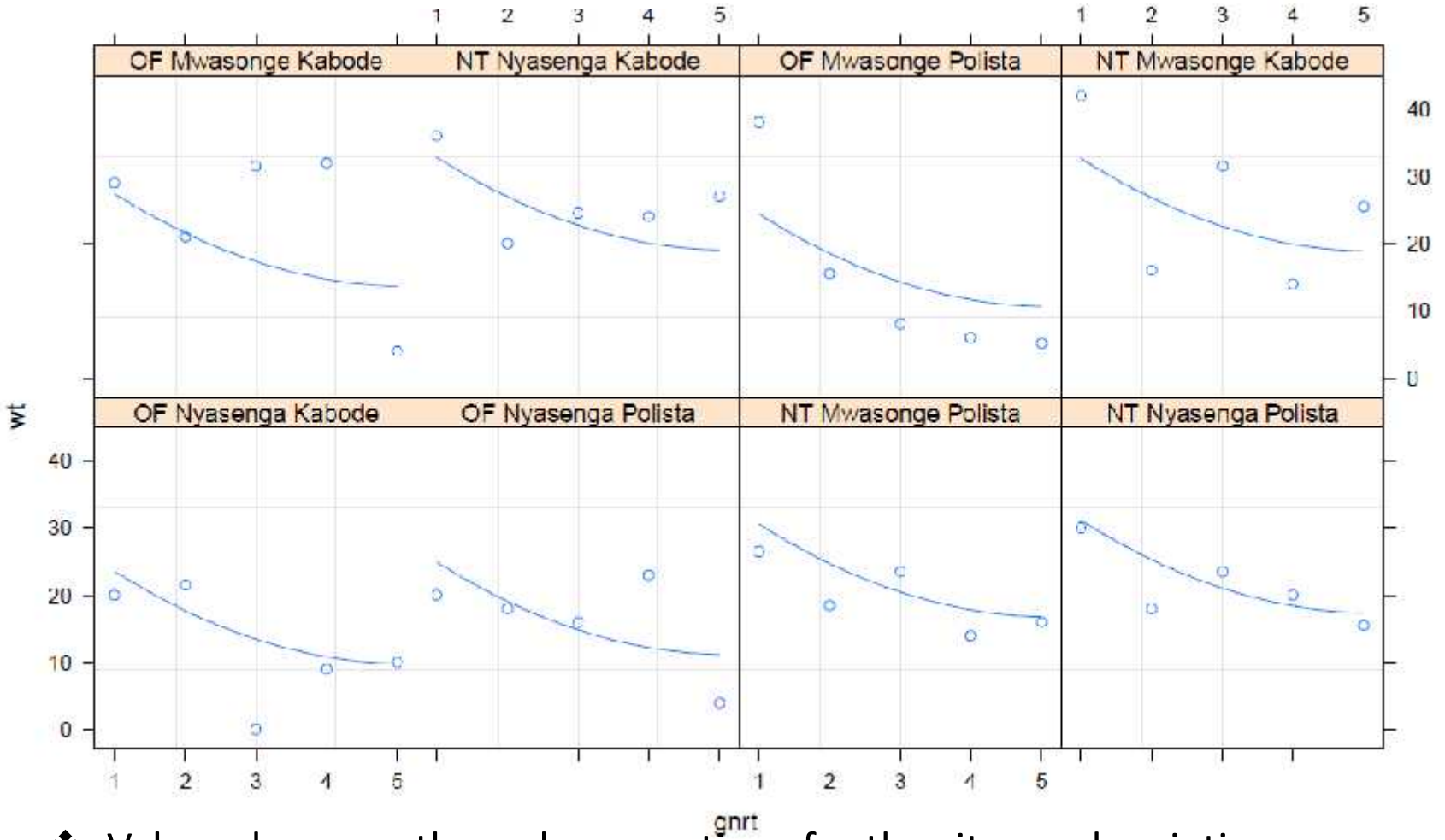


Results: A. Vine yields

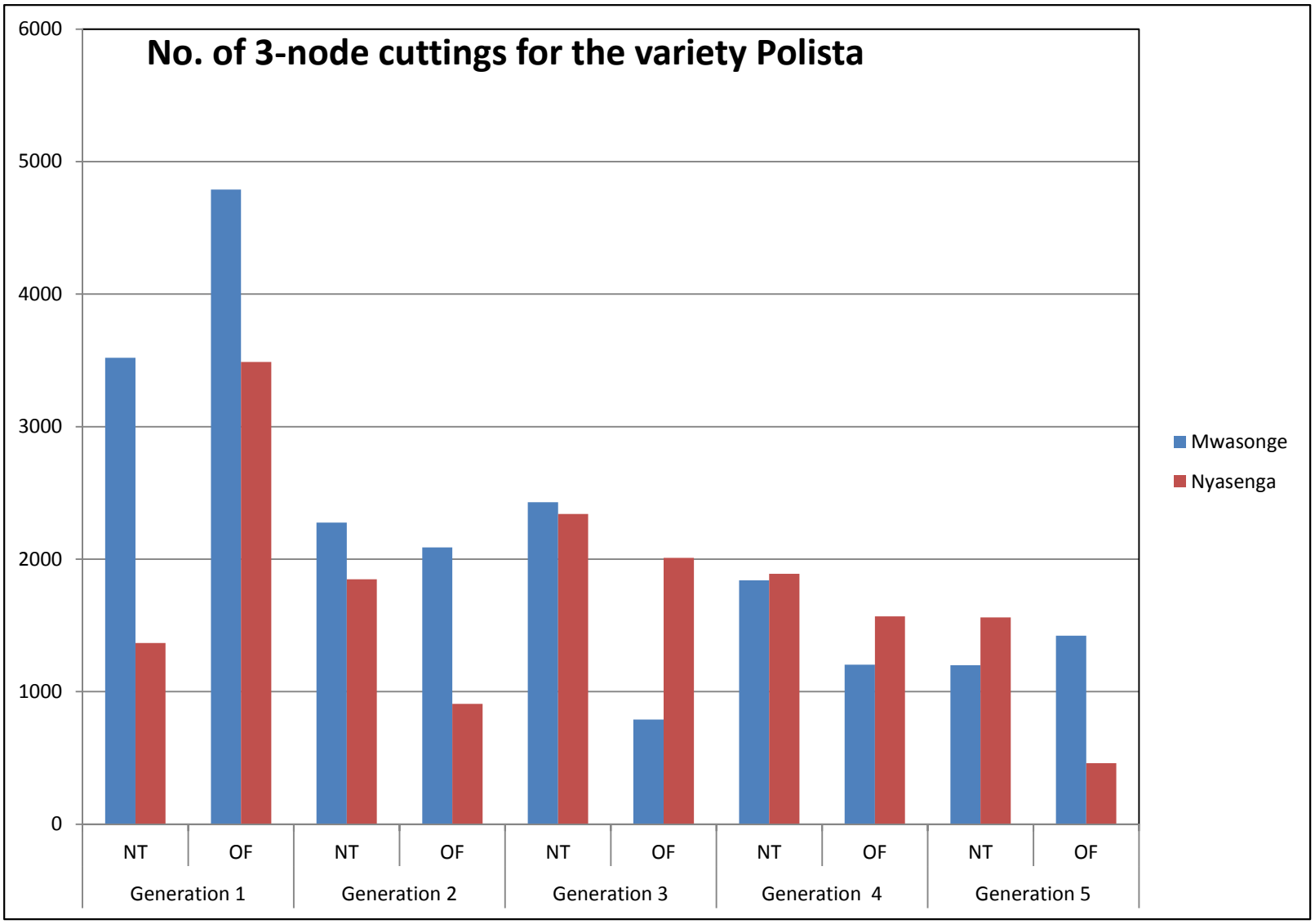


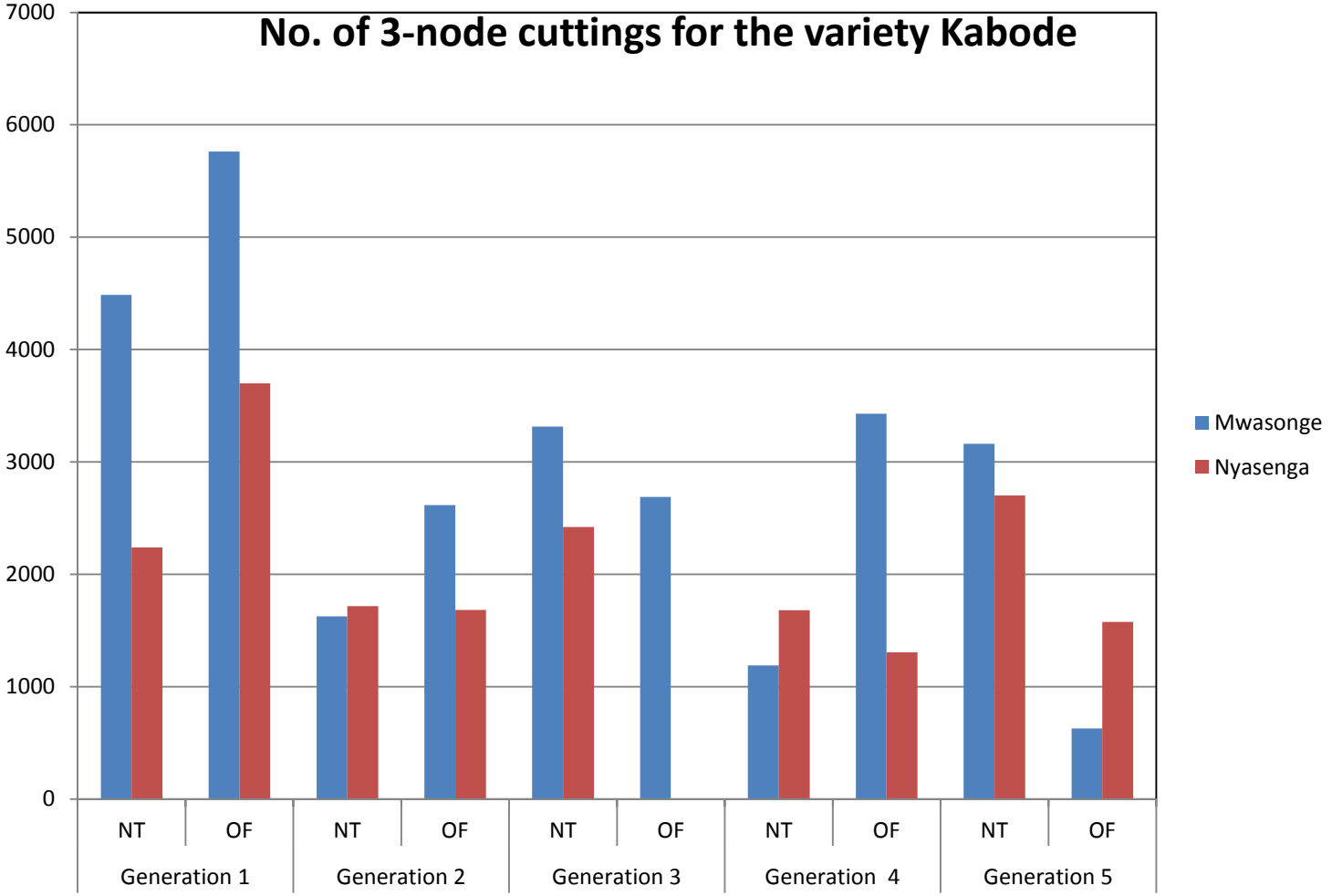

Vine yields for the variety Polista
600
500
400
300
200
100
0
No.
Wt (kg)
NT
OF
Generation 1
Generation 2
Generation 3
Generation 4
Generation 5
Mwasonge
Nyasenga

Weight of vines



- Values decrease through generations for the sites and varieties.
- NT materials weighing higher compared to OF materials. However, there are no significant differences among the slopes of the curves, which suggest that the reduction in wt is more or less the same in all the sites, varieties, tech


No. of 3-node cuttings for the variety Polista
6000
5000
4000
3000
2000
1000
0
NT
OF
Generation 1
Generation 2
Generation 3
Generation 4
Generation 5
Mwasonge
Nyasenga

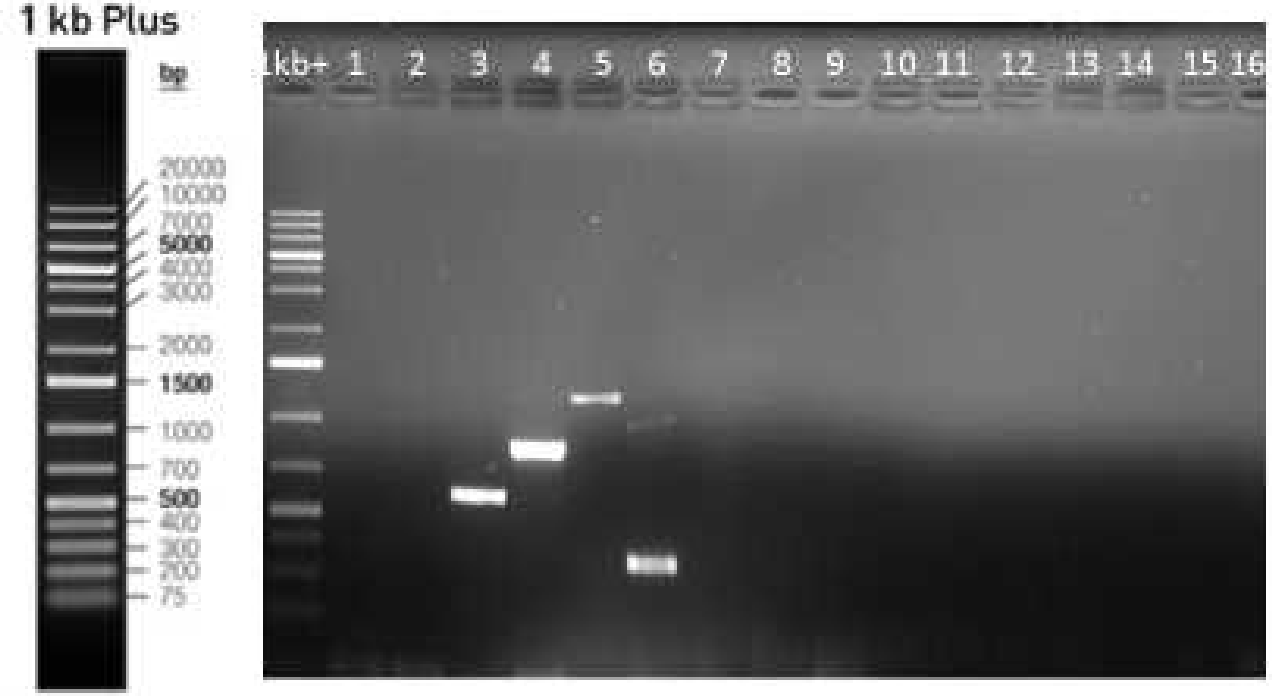

No. of 3-node cuttings for the variety Kabode
7000
6000
5000
4000
3000
2000
1000
0
NT
OF
Generation 1
Generation 2
Generation 3
Generation 4
Generation 5
Mwasonge
Nyasenga

B. Virus testing via PCR

- Samples were screened for begomovirus, potyviruses and SPCSV using polymerase chain reaction (PCR), reverse transcriptase PCR and real time PCR respectively.
- All samples from Crop Biosciences Ltd TC lab tested negative for all the viruses
- Batch 1 – 4 samples from Mwasonge and Nyasenga also tested negative for potyviruses and begomoviruses
- Testing of field samples for SPCSV via real time PCR not successful:
  - Low quality DNA
  - To be repeated

Results of samples from Crop Biosciences Ltd

Amplification of Potyviruses from sweet potato samples using SPG,SPC,SPF,SP2 and SPFCG2 primer
All samples except controls were negative



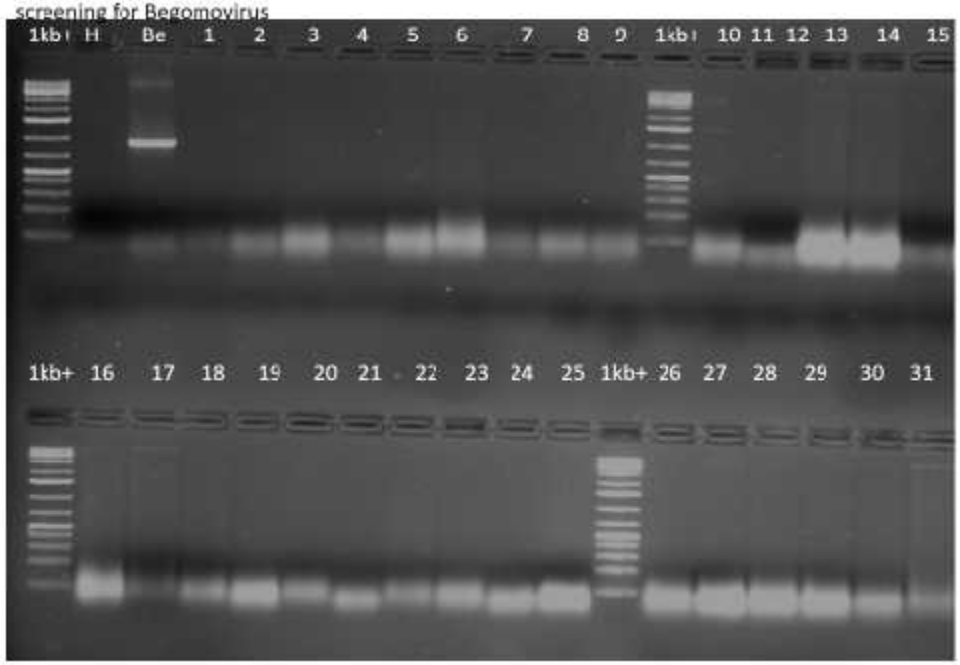
1 = Health sample, 2 =blank ,3=SPFMV,4=SPVC,5=SPVG,6=SPV2,7=1-5 sample from Arusha batch 8=6-10,7=11-15,8=16-20,9=21-25,10=26-30,11=31-35,12=36-40,13=41-45,14=46-50,15=51-55, 16=56-60

Representative results of samples from the field

H =Health, B= Mix+ water,(SPF,SPC,SPG are positive control),1-12 are samples from site

Potyviruses (batch 2)

Representative gel picture of sweet potato samples from Nyasenga&Mwasonge samples batch 1 screening for Begomovirus



H =Health

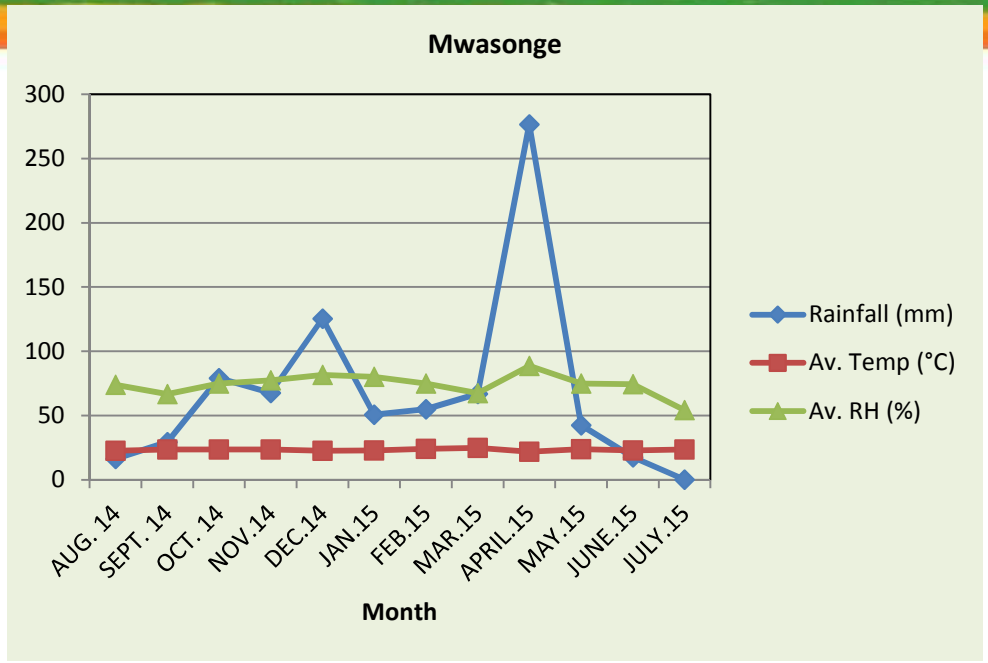
Be=Begomovirus

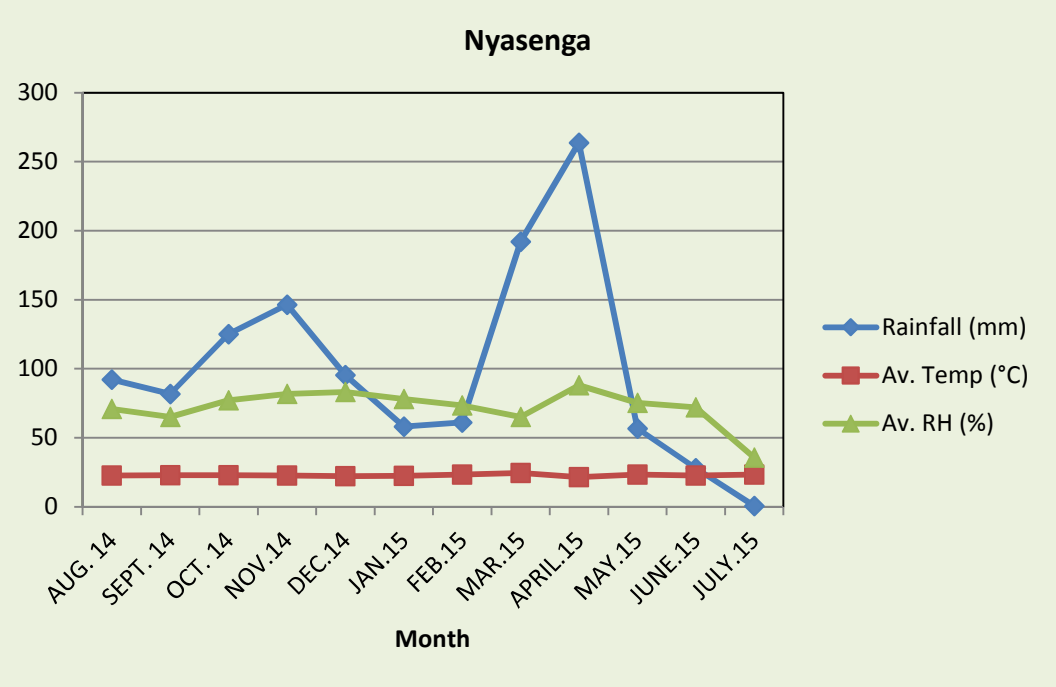
1-7=symptomatic samples(SPVD) established in screen house at MARI

8-31=sweetpotato samples from Nyasenga&Mwasonge batch 1

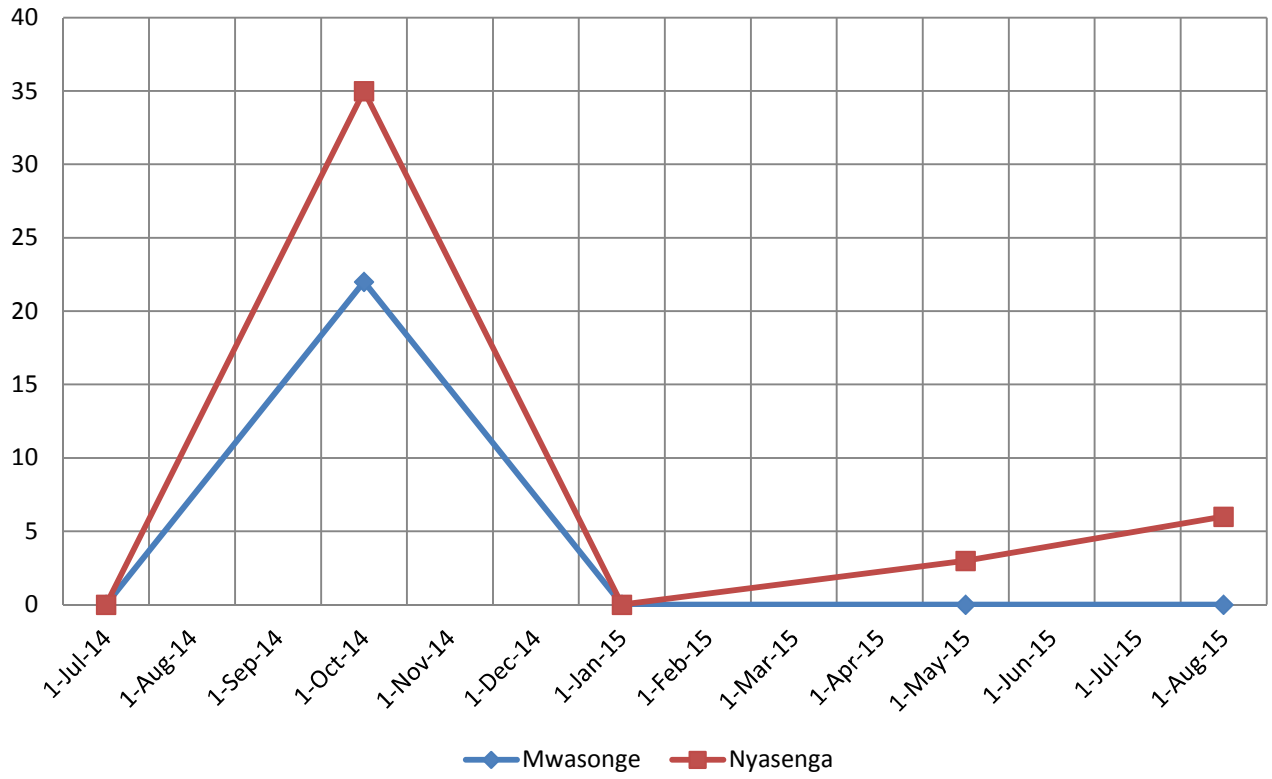
Begomo viruses (batch 1)

C. Trend in weather conditions





D. Whitefly count



E. Root yields

- The first generation of root production was adversely affected by dry conditions. – no marketable roots were produced on both sites.
- In generation two more roots (both marketable and non-marketable) were produced in Nyasenga compared to Mwasonge for both varieties.
  - Poor root production in Mwasonge was affected by high amount of manure in the soil which favored vine production at the expense of roots.
- Next root harvest: October 9, 2015

Challenges

a) Weed management

- ❖ A mulch of rice husks was applied during establishment in order to suppress weeds
- ❖ Assumed to suffice for the entire project period
- ❖ Not the case with emergence of weeds after the 1st harvest

b) Caterpillar infestation after harvesting

- ❖NTs are sprayed after harvesting before closing.
- ❖However, it has been observed that butterflies fly into the tunnels when they are open and lay eggs there.
- ❖Pesticide not effective during this stage of the life cycle.

c) Mealy bug infestation- Not SP pests but are common green house pests

- ❖The pest problem addressed by spraying with pesticides when spotted.

Conclusion

- There is a reduction in weight and vines through time.
- However, this trend is not significant for both sites and varieties

- OF values for weight are always below the NT, although for both sites and varieties this difference is not significant
- There is a clear positive effect due to the use of net tunnels

  – Provided that NT materials maintain the virus clean status, production of vines will depend on prevailing weather conditions and management.

- With good agronomic practices farmer multipliers should be able produce clean planting materials using the NTs.

- Two rounds of harvesting and sample collection remaining: Oct & Dec 2015.

Mrs. Edna Jonas standing next to her net tunnel closed with a zip
Date: 15/12/2014
Location: Bulyahilu village, Sengerema district
Photo credit: K'Ogero

Asanteni sana