CAN AN IMPROVED NUTRITION WITH FOLIAR APPLICATIONS OF MINERAL NUTRIENT BETTER HELP BANANA PLANTS TO PREVENT BLACK SIGATOKA (BS) AND POST-HARVEST DISEASE (PHD) DEVELOPMENT ?

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SCAN ME

CONTEXT

Role of nutrition in plant-pathogen interactions

- ***Excessive potassium*** *in French West Indies banana crop soils → K accumulation is antagonistic to the assimilation of Mg, Ca or B.*
- ***Mineral nutrients*** *= key factors for plant growth but also for plant-pathogen interactions [1,2]*
- ***Variable responses of Mg*** *in banana-pathogen interaction:*
  - ***Decreased severity*** *of yellow sigatoka when banana plants deficient in K, N, P, S or Mg in controlled conditions [4]*
  - ***Lower percentage of infection*** *of BS in areas where banana leaves contained lower Mg, high N, P, K, Ca, B and Zn [5]*
  - ***Reduction of BS symptoms*** *at harvest with foliar fertilization but non significant at vegetative phase or flowering [6]*

OBJECTIVES

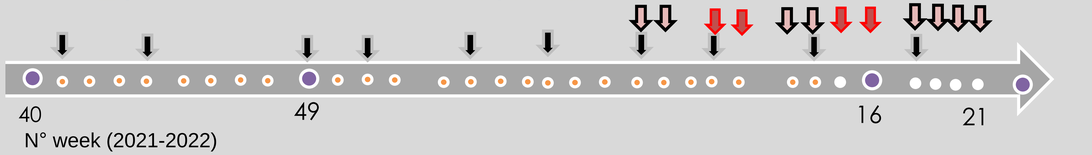
Test in real production conditions

1) EVALUATE *the impact of foliar Mg treatments :*
- *Against BS?*
- *on pre-flowering physiology*
- *at harvest & post-harvest*

2) COMPARE *efficacies when the products are preprared in water (manufacturer's recommendations) or in emulsion with paraffinic oil (producers' work habits)*

MATERIAL AND METHODS

15 parameters over 35 weeks on 240 plants



Height circumference | *BS assessment* | *Chlorophyll index* | *Traceability at harvest* | *Bunch weight* | *Pallet shipment to Dunkerque* | *PHD / ripe rate assesment* | *Data analysis*

Conditions	Doses
1. Untreated control	-
2. Paraffinic oil control :Banole50/Adjuvant/Water	*15 L/ha*
3. Chemical control (SICACERCOBAN program) = SICO or banole	*15L/ha -0,4L/ha*
4. Magnesium1 in Water = Timfoliup ® (MgO 530g/L)	*8 L/ha*
5. Magnesium1 in Banole = Timfoliup + Banole + Adjuvant	*8 L/ha*
6. Magnésium2 in Water =YaraVitahydromag500 (MgO 500 g/L)	*8 L/ha*
[CEB method n°190] Treatments on 3 double rows x 4 blocks per condition Measurements on 10 plants from the central row x 4 blocks per condition	

Backpack mist sprayer - 30L/ha, every 3 weeks

Harvests – 850°d

Production peaks : harvest for PHD evaluation

BS assesments : Youngest Leaf bearing Streaks (YLBS), Stage of Evolution of disease (SED), Youngest Leaf bearing Necrosis (YLBN)

Physiology measurements at T0 and flowering : chlorophyll index, circumference/heignt; Samplings for leaf mineral elements content, …

MAIN RESULTS

Fig1: AUDPC of SED during pre-flowering phase (week 40 to 49)

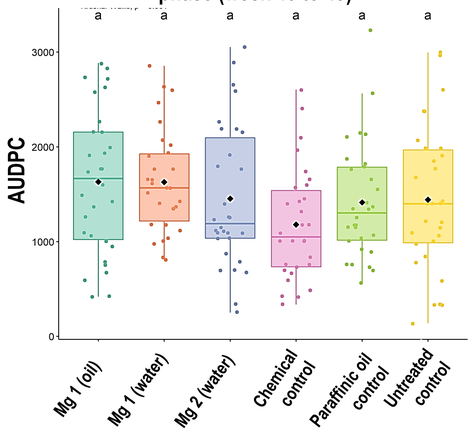


Fig 2: AUDPC of YLBN until first harvest (week 40 to 13)

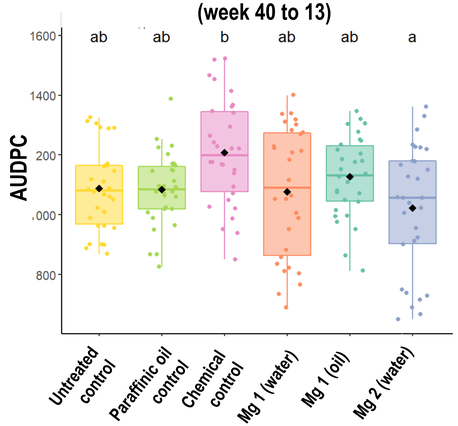


Fig 3: Ripe rate at dock (4 shipments)

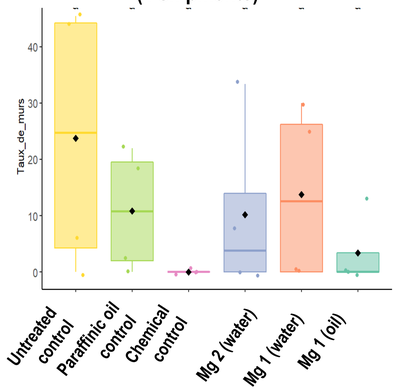
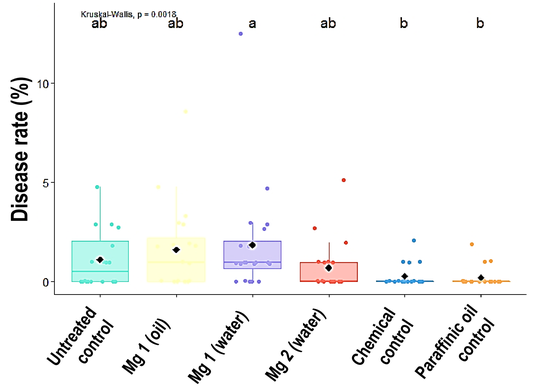


Fig 4: Crown rot disease rate after ripening



	Untreated control	Paraffinic oil control	Chemical control	*Mg1 (water)*	Mg 1 (Oil)	Mg 2 (water)
N total %	*2,5*	*2,5*	*2,6*	*2,5*	*2,5*	*2,6*
P total %	*0,18*	*0,18*	*0,18*	*0,20*	*0,19*	*0,18*
K total %	*4,3*	*4,3*	*4,4*	*4,3*	*4,3*	*4,4*
Ca total %	*0,92*	*0,96*	*0,92*	*0,91*	*0,89*	*0,85*
Mg total %	***0,26***	***0,28***	***0,27***	***0,30***	***0,32***	***0,25***
Zn total ppm	*14,3*	*14,8*	*15,3*	*15,3*	*16,5*	*14,8*
Mn total ppm	*1 266*	*1 219*	*778*	*1 021*	*1 080*	*807*
Cu total ppm	*7,8*	*8,3*	*8,8*	*8,5*	*8,8*	*7,8*
Fe total ppm	*128*	*133*	*130*	*120*	*116*	*122*
B total ppm	*9,5*	*8,0*	*8,5*	*9,3*	*10,0*	*8,3*

Table1 :Leaf mineral content assay at flowering reveals no significant increase in Mg content in Mg treated plants

CONCLUSION & PERSPECTIVES

- ***Sudden decrease of BS pressure*** *: chemical control = untreated control for pre flowering phase : why?*
- ***Foliar Mg prepared in water*** *does not seem to impact any measured parameters → how about* ***bioavailability, penetration?***
- ***Foliar Mg in oil*** *seem to reduce ripe rate at dock arrival for some shipments, but non significant from oil control*
- ***1 cycle in high pressure of BS → pursuing on 2nd/3rd cycles*** *and/or* ***intermediate*** *disease pressure ?*

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