

Role of two aphid species and population density on Beet Yellows Virus transmission

Olivera Popov,¹ Amélie Monteiro,² Anas Cherqui,¹ Kévin Tougeron^{1, 3}

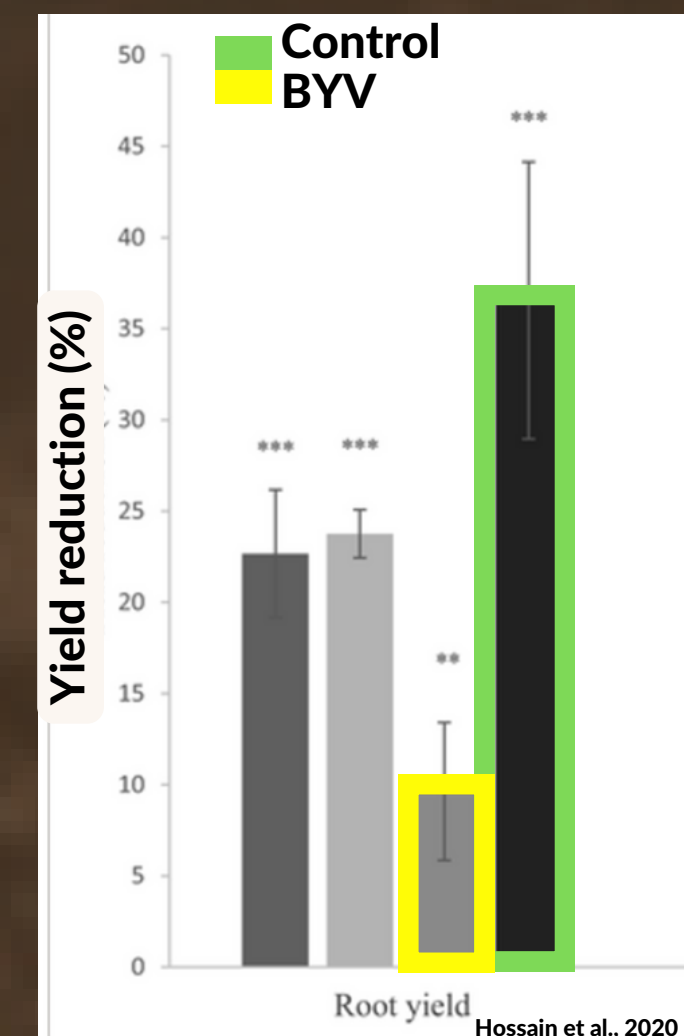
1. UMR CNRS 7058 EDYSAN (Écologie et Dynamique des Systèmes Anthropisés), Université de Picardie Jules Verne, 33 rue St Leu, 80039 Amiens, France

2. ITB (Institut Technique de la Betterave), 45 Rue de Naples, 75008 Paris

3. Université de Mons, Institut de Recherche en Biosciences, 6 Av. Champ de Mars, 7000 Mons, Belgium

General background

Beet yellows virus (BYV) is a **sugar beet virus** that negatively impacts yields



Reduces the photosynthetic area of leaves and sugar content

Neonicotinoids (NNIs) were controlling BYV efficiently for more than 30y by repressing its main vectors

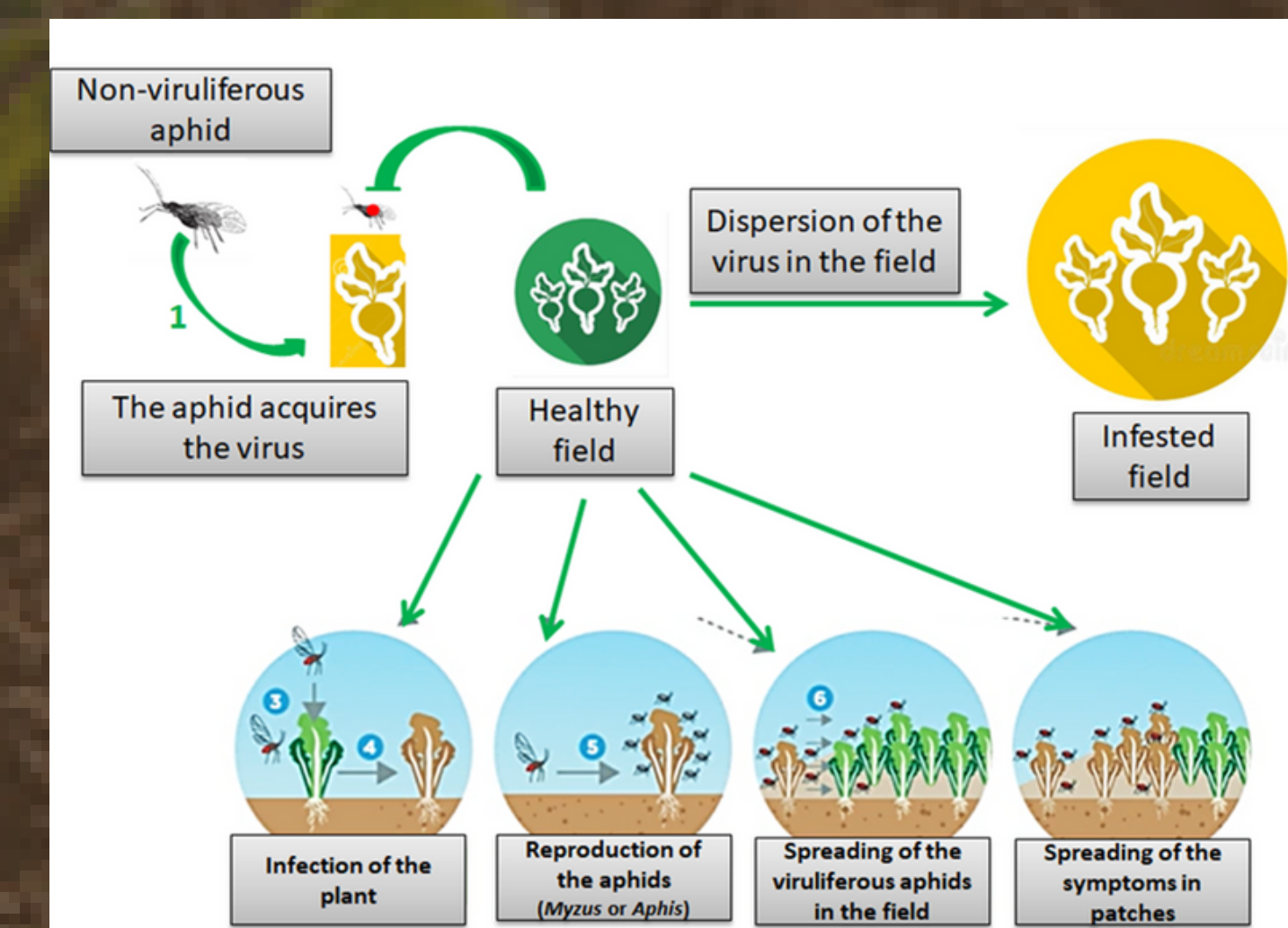


- The **main vectors** of the BYV are aphids: *Myzus persicae* (the green peach aphid)¹ & *Aphis fabae* (the black bean aphid)²



Better understanding of the virus-vector-plant interactions

Through observation of virus transmission and relationships between vectors

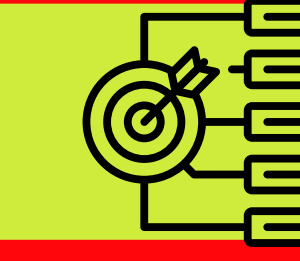


What is known so far?

- 10 apterous *Myzus persicae* are enough to transmit the virus
- Winged aphids are transmitters of the virus as well
- Both *Myzus persicae* and *Aphis fabae* can spread the virus

What is unknown?

- What is the intensity of the viral transmission with different vector species?
- What is the transmission rate with a lower aphid population (<10 aphids)?
- What is the efficiency of the viral transmission when winged aphids are present?



Objectives

Main aspects VIRUS-VECTOR interactions

Different morphs (winged/apterous)

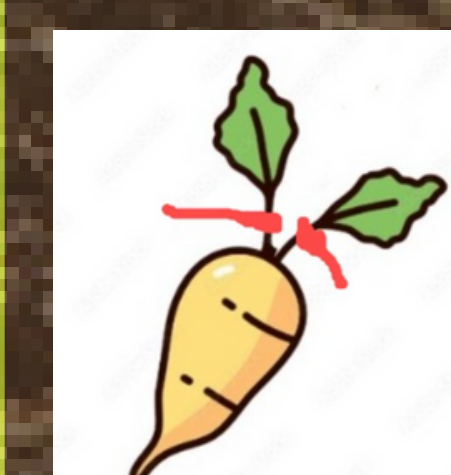
Different aphid species (*Myzus persicae* & *Aphis fabae*)

Different aphid densities (3, 8 & 13)

Research question

What species, *Myzus persicae* or *Aphis fabae* and in what number and morph is the main vector of BYV?

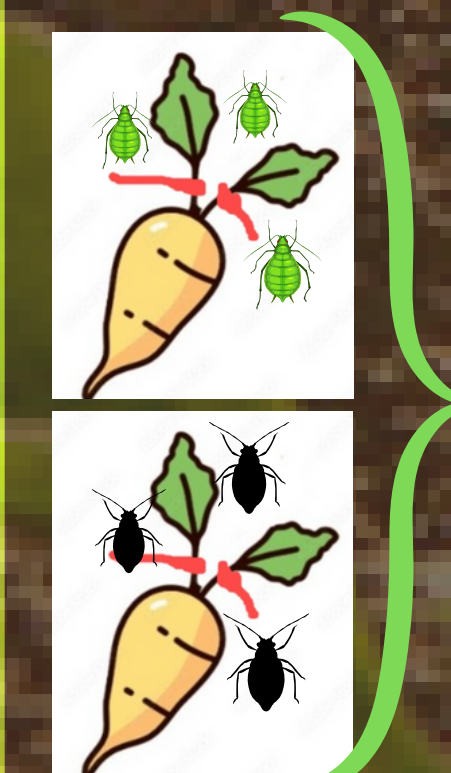
Material & methods



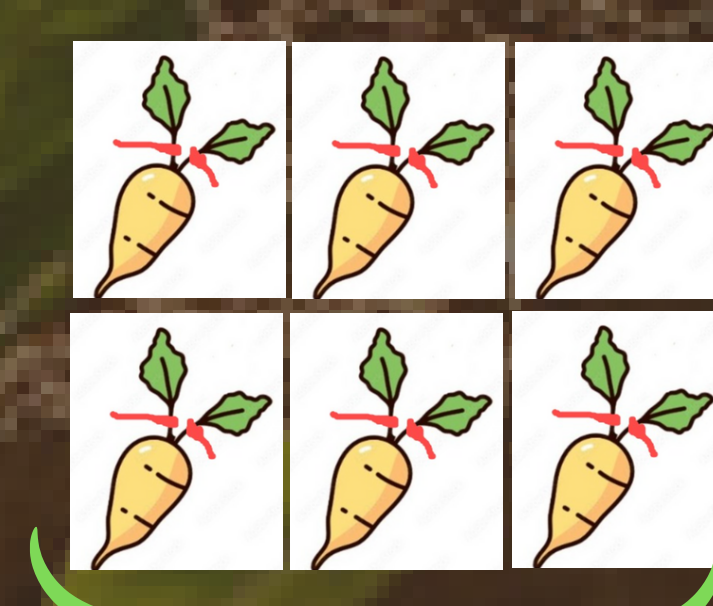
- Plants: 3 week-old (2 leaf-stage)
- First two leaves marked
- Set in the individual cages

- Investigation if the variation in: **number**, **type** and **morph** has an effect on virus transmission
- 36 plants** were in use for both **apterous** and **winged** aphids
- 12 plants in 3 rounds were in use

6 plants infested with 3 or 8 or 13 viruliferous aphids either winged or apterous



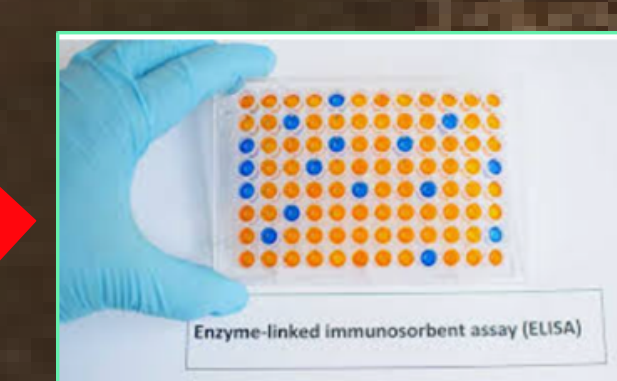
Killing of the aphids manually 24h post application



Plants developed the infection for 3 weeks



After 3 weeks, labeled leaves were collected and frozen (-80°C)



ELISA test to verify the virus transmission



Predictions

Great transmission rate with:

- * High aphid density
- * *Myzus persicae* being a vector
- * Winged aphid morphs

Literature

1. Hossain R., Menzel W., Lachmann C., Varrelmann M. 2021. Plant Pathology. 70(3): 584-593.
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5. Smith H., Hallsworth P. 1990. Annals of Applied Biology. 116(4): 503-511.