

Introduction



Figure 1. PYVV symptomatic potato plant.

Potato yellow vein virus (PYVV) (*Crinivirus/Closteroviridae*) (Martelli *et al.*, 2012), is an re-emerging plant virus (Salazar *et al.*, 2000), spread in all Colombian potato producing areas. PYVV is transmitted by the greenhouse whitefly (*Trialeurodes vaporariorum*) in a semipersistent manner (Buritica, 1971). For the implementation of effective strategies for PYVV/*T. vaporariorum* control is necessary information about the relationship between the virus and its vector. In the present study PYVV transmission characteristics by *T. vaporariorum*: acquisition access period (AAP), retention period (RP) and inoculation access period (IAP) were evaluated. This is a new report related with PYVV/whitefly complex.

Materials and Methods

Plant Material

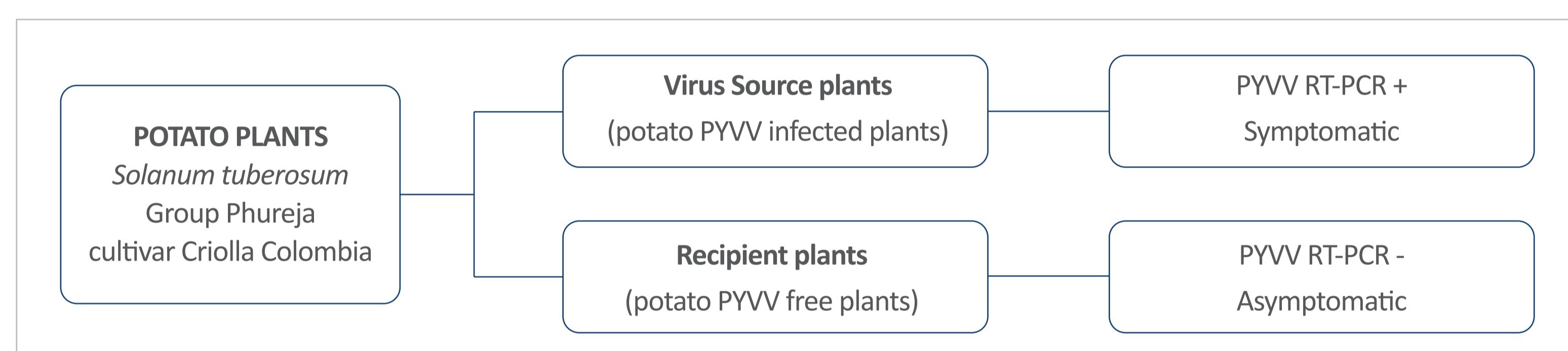


Figure 2. Plant material

Assays for virus transmission

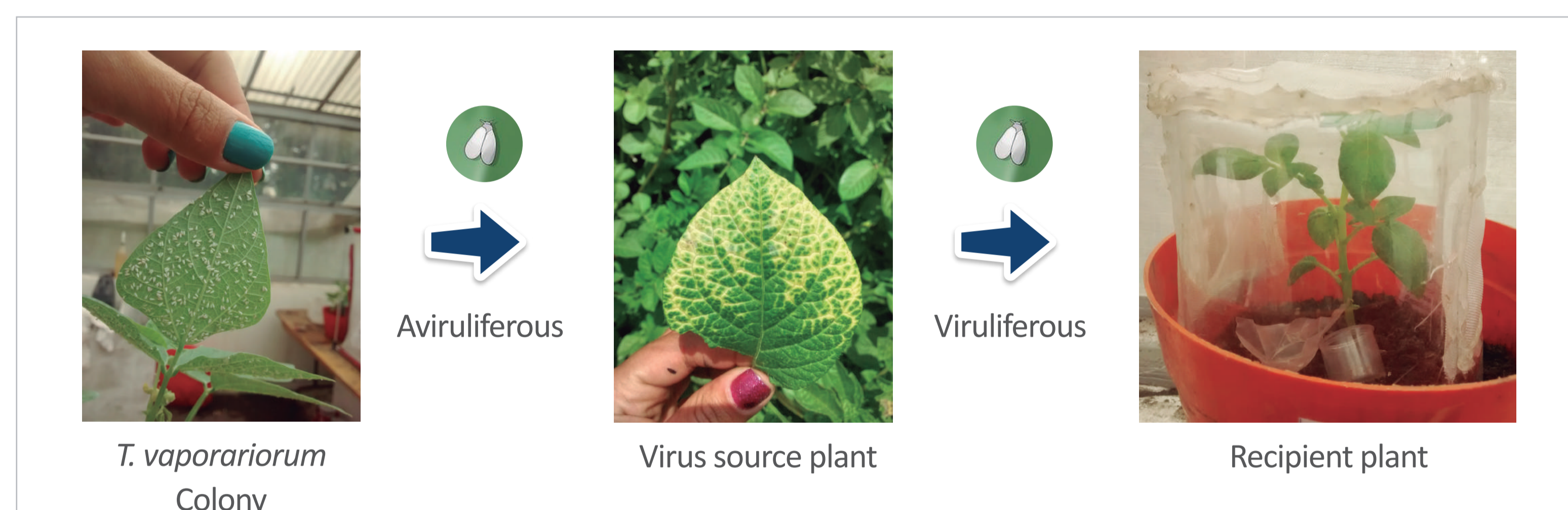


Figure 3. Assays of PYVV transmission by *T. vaporariorum*.

AAP, RP and IAP

Table 1. Transmission traits evaluated

Transmission characteristic	Treatment	Transmission conditions
AAP	1, 3, 6, 12, 24 and 48 hours	RP: 2h of harvesting IAP: 72h
RP	1, 2, 3, 4 and 8 hours	AAP: One week IAP: 72h
IAP	1, 3, 6, 12, 24 and 48 hours	AAP: One week RP: 2h of harvesting
Insect density	1, 5, 10, 30, 50 and 100 adults	AAP: One week RP: 2h of harvesting IAP: 72h

The experimental unit was ten recipient plants for each treatment with three repetitions and two replicates.

- Presence/absence virus:
- Symptom expression
 - RT-PCR of PYVV.

number of PYVV RT-PCR + plants
tested plants

Variance analysis with Duncan's
new multiple range

Results

Insect density

Efficiency of PYVV transmission was positively related to the number of whiteflies. A minimum of ten adults per plant were required for the transmission of PYVV.

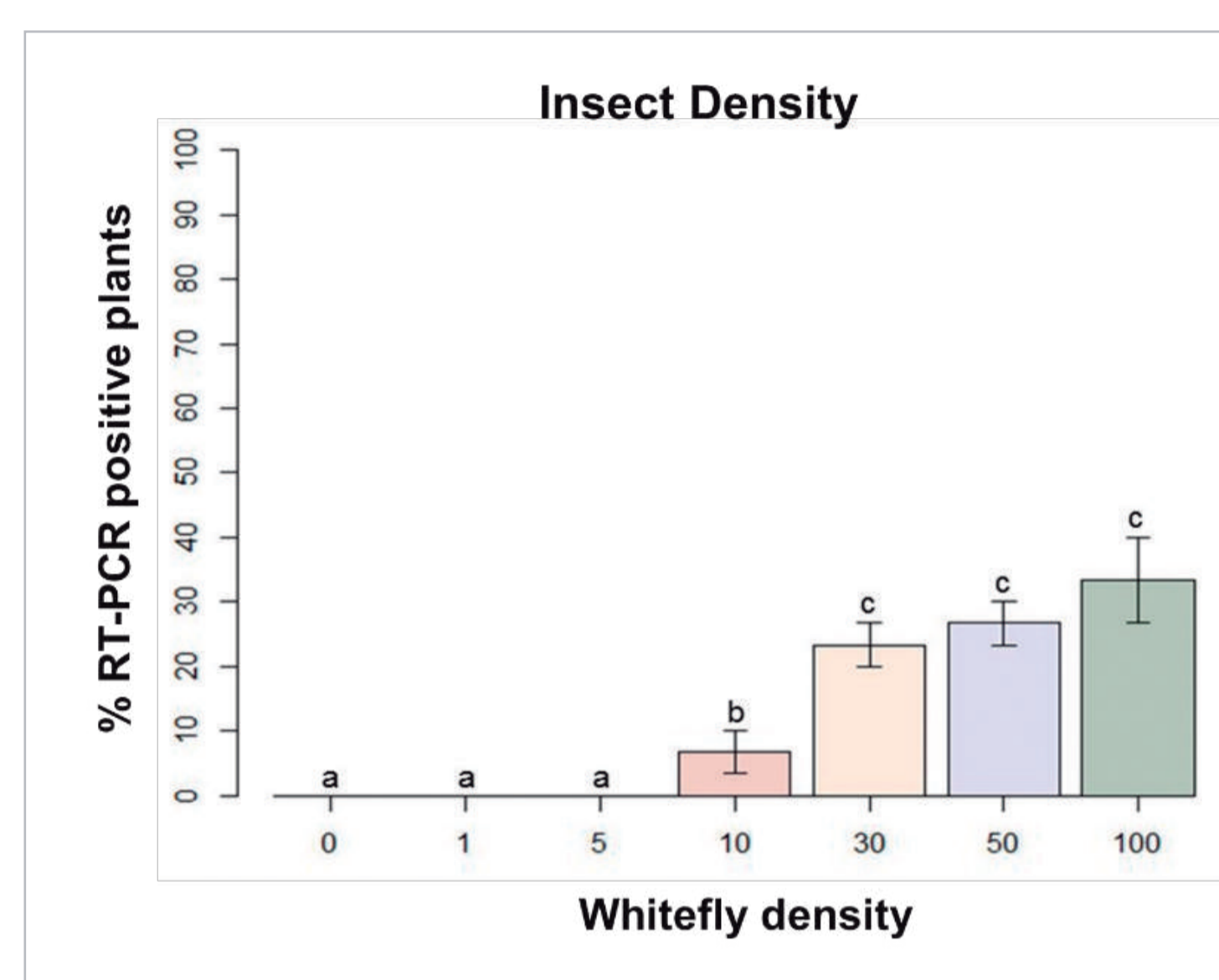


Figure 4. Effect of insect density. Data shown are mean \pm SE.

Acquisition access period (AAP)

PYVV transmission efficiency of *T. vaporariorum* was positively correlated with AAP ($F=21.38, p<0.05$).

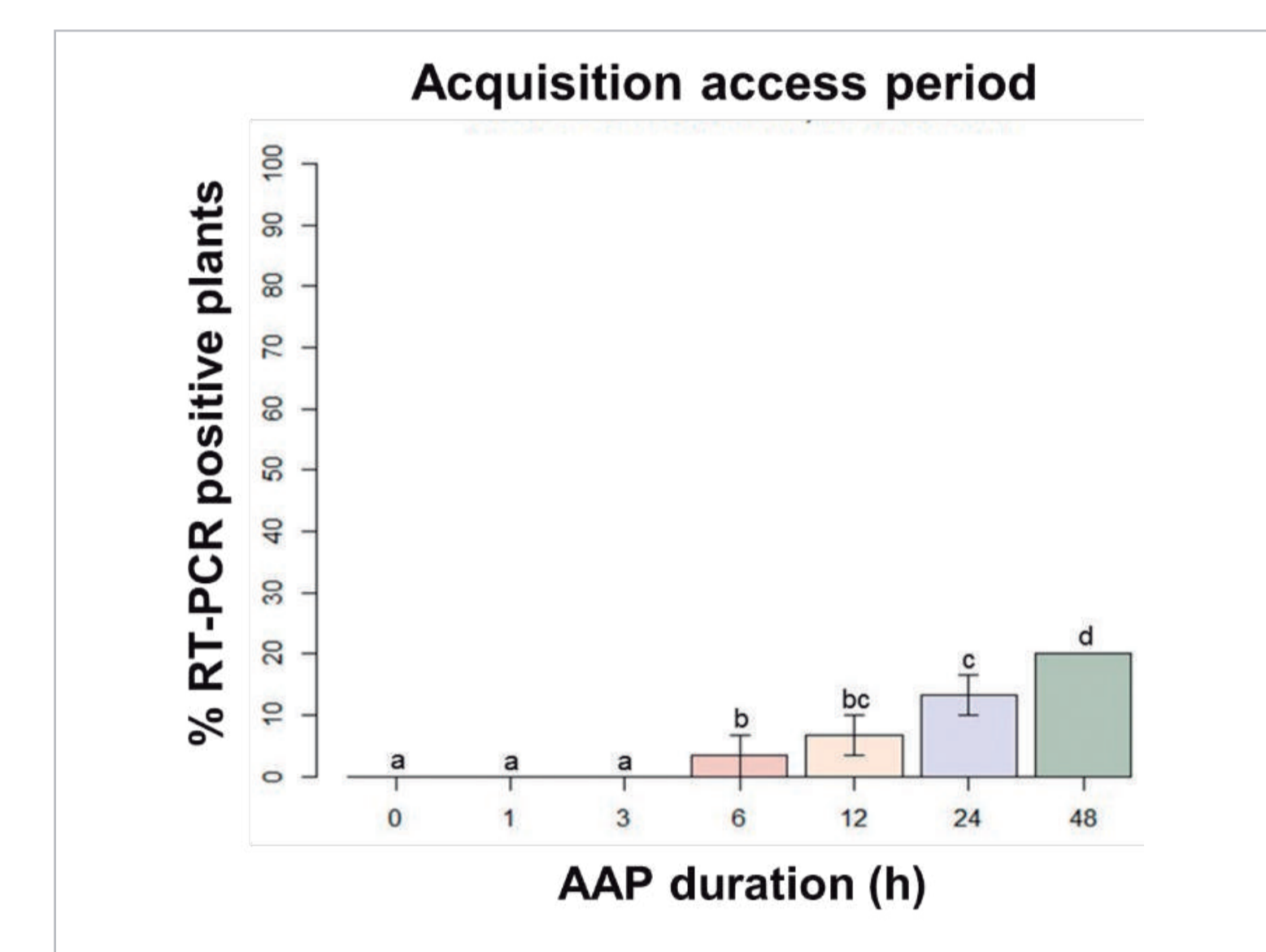


Figure 5. Effect of AAP. Data shown are mean \pm SE.

Retention period (RP)

The proportions of RT-PCR positive infected plants decreased with time ($F=15.98, p<0.05$). After three hours of retention the reduction in efficiency was stronger.

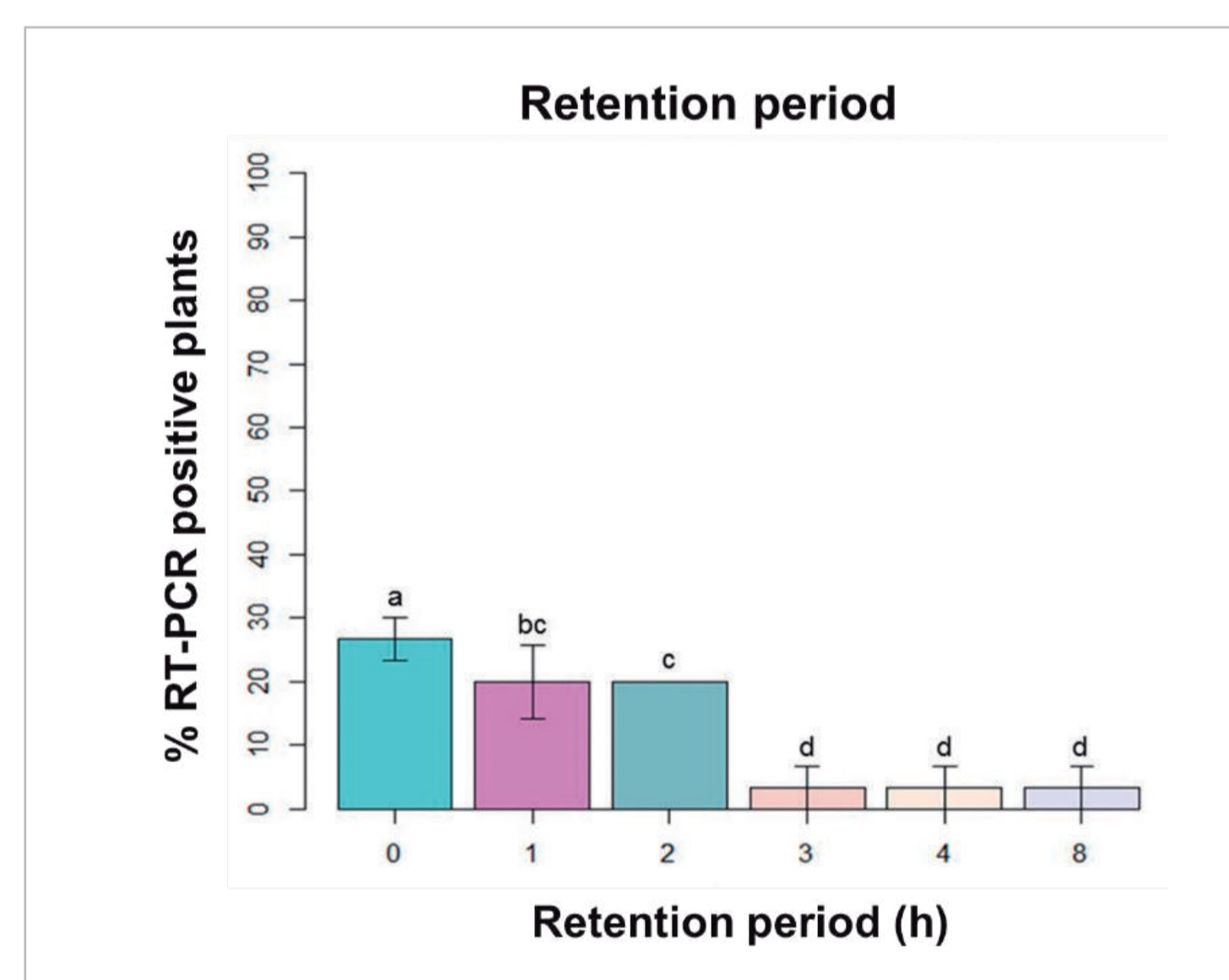


Figure 6. Effect of RP. Data shown are mean \pm SE.

Inoculation access period (IAP)

PYVV transmission efficiency of *T. vaporariorum* was positively correlated with IAP ($F=21.38, p<0.05$).

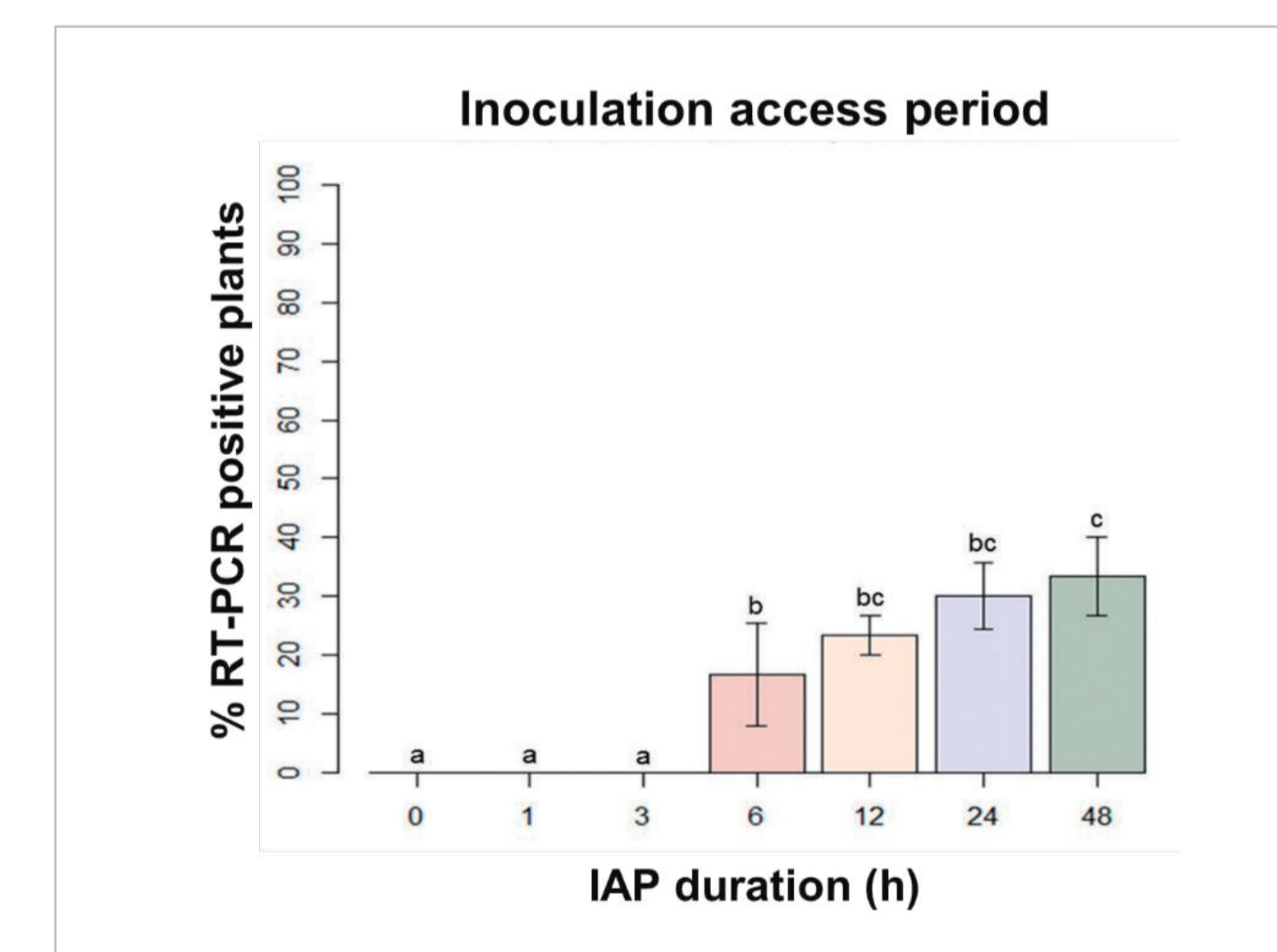


Figure 7. Effect of IAP. Data shown are mean \pm SE.

Conclusions

- Transmission efficiency of PYVV is vector-number dependent.
- PYVV was transmissible after 6 h of acquisition.
- PYVV could be retained and transmitted to recipient plants as long as eight hours with low transmission efficiency.
- PYVV was transmissible after 6 h of inoculation, though the transmission efficiency was still lower.
- Our results have shown that PYVV transmission characteristics confirm a semipersistent type of transmission.

References

Buritica, P. 1971. Estudios de transmisión del amarillamiento de las venas de la papa. Informe Anual Programa de Fitopatología ICA (Bogotá - Colombia) 111 - 113.

Martelli, G.P., Agranovsky, A.A., Bar-Joseph, M., Boscia, D., Candresse, T., Coutts, R.H.A., Dolja, V.V., Hu, J.S., Jelkmann, W., Karasev, A.V., Martin, R.R., Minafra, A., Namba, S., and Vetten, H.J. 2012. Family Closteroviridae. In: King, A., Adams, M.J., Carstens, E.B., and Lefkowitz E. (eds). Virus Taxonomy. Ninth Report of the International Committee on Taxonomy of Viruses, pp. 987-1001. Elsevier-Academic Press, Amsterdam, The Netherlands.

Salazar LF, Muller G, Lazarte V, Querci M, Zapata JL, Owen RA, 2000. Potato yellow vein virus: its host range, distribution in South America and identification as a Crinivirus transmitted by *Trialeurodes vaporariorum*. Annals of Applied Biology 137, 7-19.