INFLUENCE OF PVY INFECTION ON CHEMICAL COMPOSITION OF TOBACCO

Przybys M., Czubacka A.
Institute of Soil Science and Plant Cultivation – State Research Institute
Department of Plant Breeding and Biotechnology, ul. Krancowa 8, 24-100 Pulawy, Poland

INTRODUCTION

Potato virus Y (PVY) is the type member of the genus *Potyvirus* in family *Potyviridae*. PVY has a worldwide distribution and is one of the most economically important virus in tobacco. PVY reduces assimilation, gas exchange and transport of water and mineral salts to leaf tissues. It affects cell metabolism, resulting in changes in the chemical composition of tobacco, and finally it influences the taste and aroma of cigarettes.

OBJECTIVES

The objective of this study was to determine changes in content of nicotine, nornicotine, proteins and reducing carbohydrates in tobacco infected with PVY.

MATERIALS & METHODS

Viral and plant material

- Virus isolate for artificial inoculation: PVY 4 (GenBank accession no. JF927752)
- *Nicotiana tabacum cv.* Xanthi PVY inoculated and non-inoculated (control)
- Plant grown in temperature- and humidity-controlled chamber
  - Temperature/Humidity conditions: 20°C/65%
  - Photoperiod: 16 hours

Extraction of alkaloids

- Grinding of freeze-dried samples in FOSS Cyclotec 1093
- Extraction in MTBE with IS (chinoline 0.4mg/ml)

Determination of alkaloids by GC/MS

- Injector: 220°C
- Injection volume: 1µl
- Split ratio: 1:20
- Column: J&W DB-5ms (30m x 250µm x 0.25µm)
- Carrier: He 6.0 – 1ml/min
- Temperature Program
  - Initial temperature: 115°C hold for 10min
  - Rate: 5°C/min to 200°C hold for 2min
  - Rate: 50°C/min to 280°C hold for 10min
- Transfer line temperature: 250°C
- Ion source temperature: 230°C
- Quadrupole temperature: 150°C
- MS Mode: SIM (ions 102, 129; 84, 133 & 70, 119)

Determination of protein

- according to IUNG-PIB research procedure: PB 33.1/II

Determination of reducing carbohydrates

- According to: PN-EN: A_9904-07:1998 norm

RESULTS

- The PVY inoculation of the plants caused decrease in average nicotine and nornicotine content by 71% and 9%, respectively (Fig. 1).
- The content of true protein in tobacco leaves 14 days after inoculation significantly decreased to 10.83%, while sugar content increased by 8% to 15.95% of air dry matter (Fig. 2).

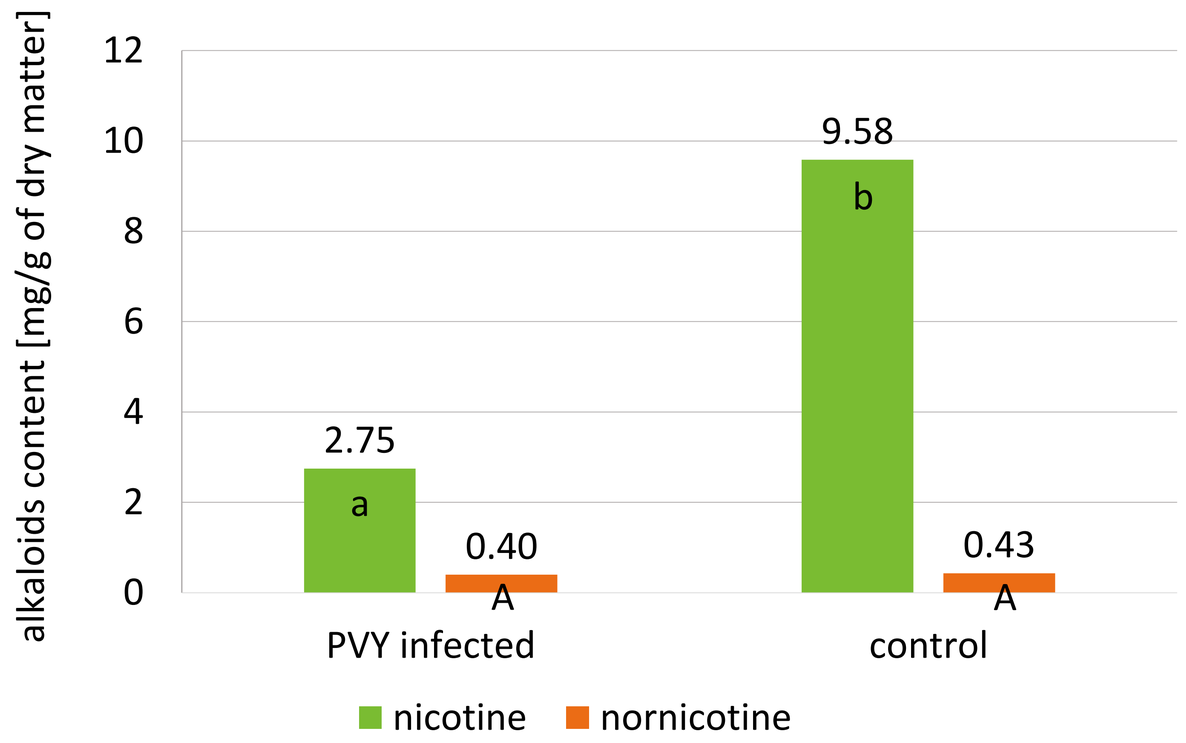

Fig. 1. Alkaloid content of artificially infected and control tobacco plants.

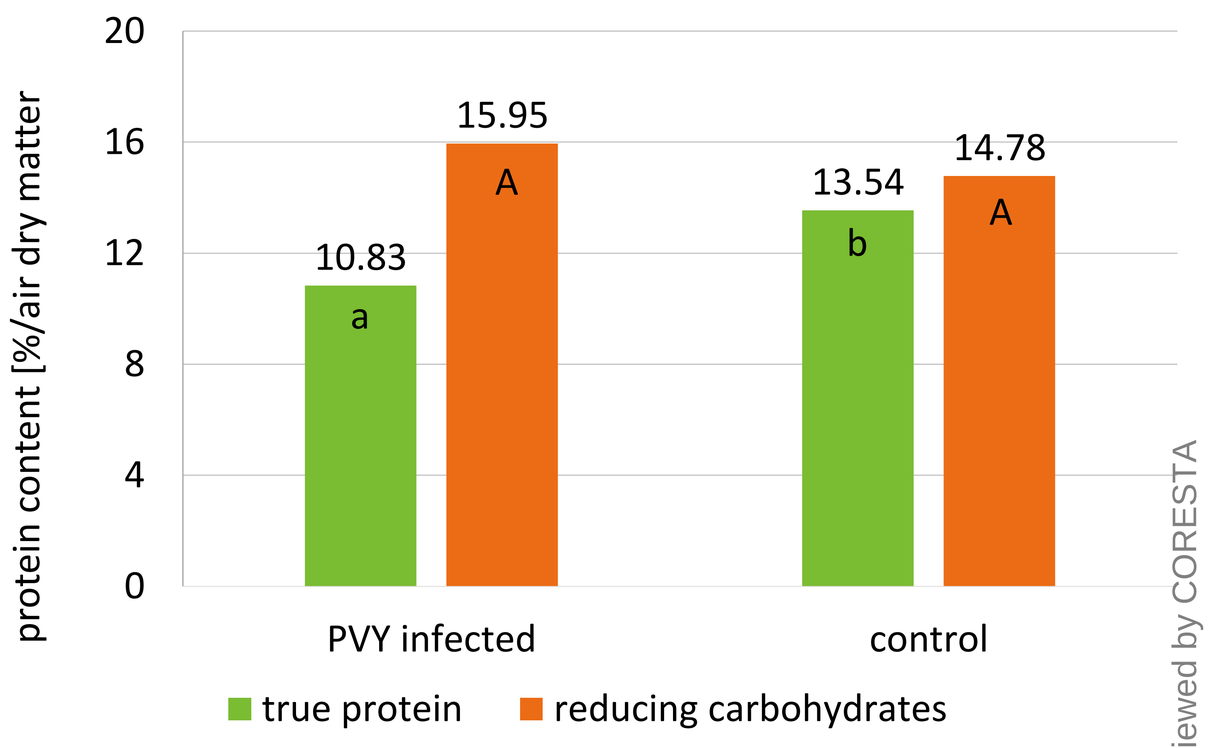

Fig. 2. True protein and reducing carbohydrates content of artificial infected and control tobacco plants.

CONCLUSIONS

Obtained results revealed that PVY infection changed the chemical composition of tobacco. There was statistically significant effect on nicotine and protein content.