J. Appl. Genet. 36(3), 1995, pp. 251-253

Identification of acidic pathogenesis-related (PR) proteins in potato leaves infected with potato virus Y

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Abstract. The induction of acidic proteins in seven potato cultivars (Drop, Atol, Sokół, Tarpan, Jagna, Irga, Darga) was analysed. It has been found that induction of the acidic pathogenesis-related (PR) proteins in potato leaves infected with a necrotic strain of potato virus Y (PVY-N Wi) is specific to each cultivar.

Key words: acidic PR proteins, potato cultivars, potato virus Y.

Pathogenesis-related (PR) proteins have been detected in plants infected with fungi, bacteria, viruses or viroids, or treated with chemical agents. Most of information about PR proteins has been obtained for tobacco (*Nicotiana tabacum*) after its infection with tobacco mosaic virus (TMV) (CARR, KLESSIG 1989).

There are few reports of PR protein accumulation in potato. PARENT and ASSELIN (1987) investigated acidic and basic PR proteins in potato cultivars reacting hypersensitively to TMV infection. KOMBRINK et al.(1988) studied PR protein accumulation in potato leaves after inoculation with *Phytophthora infestans* or after treatment with *P. infestans* derived elicitor. PIERPOINT et al. (1990) identified acidic proteins in response to spraying of potato leaves with salicylate.

MARCZEWSKI (1994) showed that the induction of acidic PR proteins was independent of symptoms incited by different strains of PVY. The induction

Received: May 1995. The paper was presented at the National Symposium on: "The use of electrophoretic protein analysis in plant genetics, breeding and taxonomy", held at the Institute of Plant Genetics, Polish Academy of Sciences, Poznań, Poland, February 23, 1995. This work was supported by grant 5.0237.91.01 of the State Committee for Scientific Research.
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of basic PR proteins was correlated with symptoms. The patterns of both groups of PR proteins were independent of PVY strains. Then, basic PR proteins were found to be independent of the potato genotype.

In the present assays the induction of acidic proteins depending on potato cultivars was analysed.

Material and methods

Potato plants of the cvs. Drop, Atol, Sokół, Tarpan, Jagna, Irga and Darga were grown from virus-free (indexed) tubers in a greenhouse under natural light, at 20-30°C. Three plants of each cultivar were mechanically inoculated with PVY-N Wi. Plants inoculated with water were used as controls. Four weeks after inoculation intercellular fluids from leaves were extracted according to OHASHI and MATSUOKA (1987) and analysed by nondenaturing electrophoresis in 10% polyacrylamide slab gel according to MAIZEL (1971). Each lane of the gels was loaded with 40 µl of a sample (roughly corresponding to 150 mg fresh leaf tissue). Gels were stained with silver nitrate (BLUM et al. 1987).

Results and discussion

Electrophoretic patterns of acidic PR proteins induced in intercellular fluids from potato leaves of seven cultivars are presented in Fig. 1. Each of three lanes for a given cultivar (or two, as for the cv. Darga) corresponds to intercellular fluids isolated from individual plants infected with PVY-N Wi (Fig. 1A-G). The presented results indicate that quantitative and qualitative differences in the induction of acidic PR proteins between the studied cultivars are constant. Only faint visible bands were observed for water inoculated plants (Fig. 1H-N).

These results confirmed those obtained by other authors that fast-migrating acidic PR proteins with a relative migration (R_f) > 0.24 (PARENT, ASSELIN 1987) or > 0.23 (PIERPOINT et al. 1990) could be used as genetic markers of potato cultivars. Moreover, this is the first demonstration that also acidic PR proteins with a lower mobility of $R_f < 0.27$ (see the upper arrow in Fig. 1) were induced in a way specific to each cultivar.

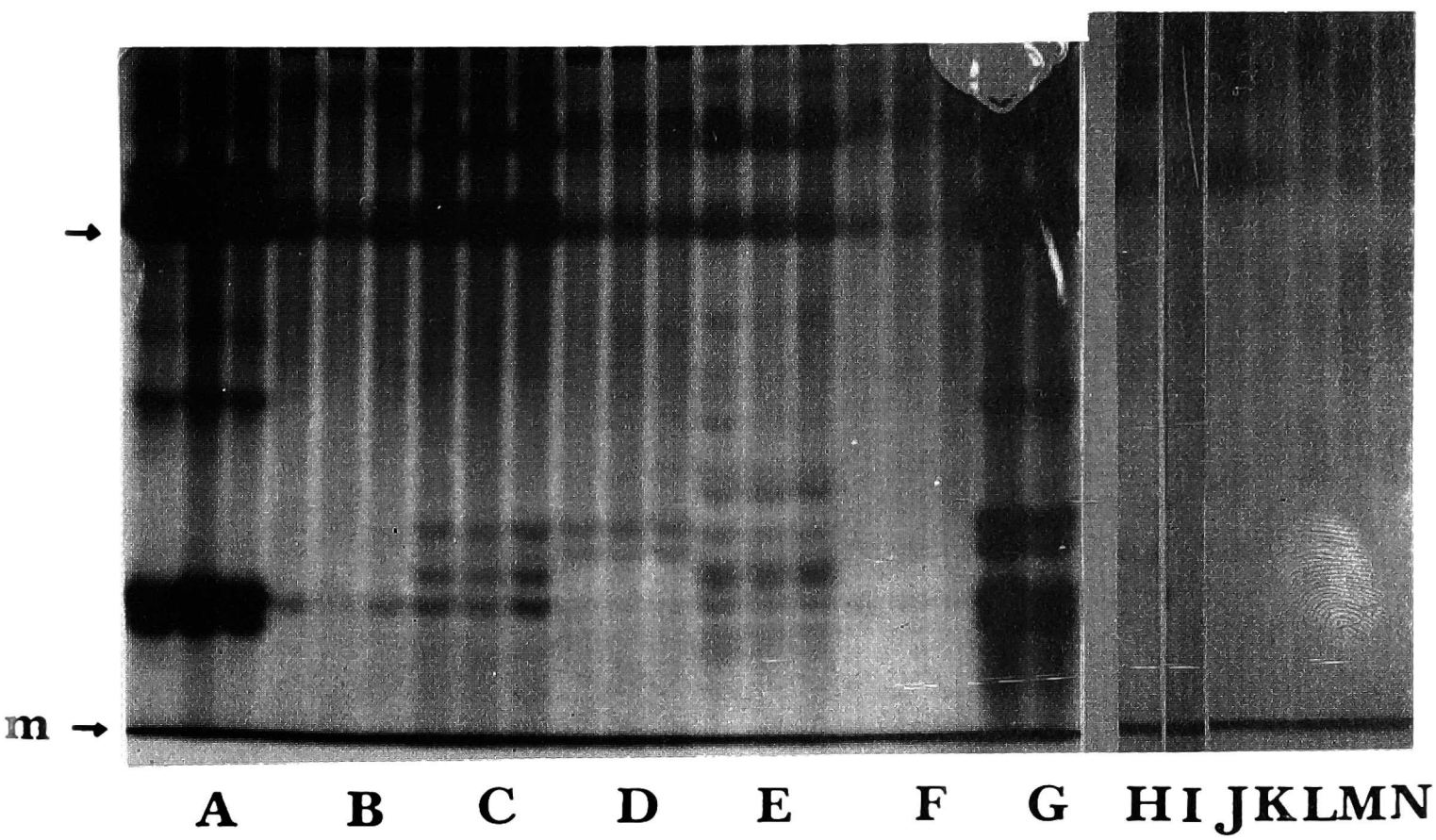

Fig. 1. Electrophoretic patterns of acidic PR proteins isolated from intercellular space of leaves of the potato cultivars Drop (A,H), Atol (B,I), Sokół (C,J), Tarpan (D,K), Jagna (E,L), Irga (F,M), Darga (G,N), infected with PVY-N Wi (A-G) or inoculated with water (H-N). Each of three following lanes A-F and two lanes G corresponds to one cultivar. The arrows indicate the position of band with $R_f = 0.27$ and the position of bromophenol blue (m) used as a marker. The direction of electrophoresis was from the cathode (–) towards the anode (+).

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