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Abstracts of contributed papers

Analysis of acid-extractable tomato leaf proteins after infection with a viroid, two viruses and a fungus

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Gel electrophoretic analysis revealed marked alterations in the pattern of acid-extractable proteins from tomato leaves after infection with a viroid (potato spindle tuber viroid), two viruses (tobacco mosaic virus, TMV, and cucumber mosaic virus, CMV), and a fungus *(Cladosporium fulvum)* when compared with the pattern from healthy leaves.

A pathogen-specific appearance of new protein bands was only found after infection with TMV (MW 17 400 and 65 000), CMV (MW 9 000 and 8 000) and *Cladosporium fulvum* (MW 28 000). With the exception of the TMV coat protein (MW 17 400) it could not be established whether the proteins are coded for by the corresponding pathogen or by the host. Nine proteins with the apparent MW of 10 000, 11 000, 12 000, 13 000, 14,000, 25 000, 31 000, 33 000 and 38 000 showed an increase in their relative concentration which is most dramatic in the case of the protein called p14 because of its MW of 14 000. A decrease was observed in four proteins with molecular weights of 14 500, 23 000, 30 000 and 105 000. Since all these alterations could be correlated with the severity of the disease symptoms but not with the nature of the pathogen they must be considered as a general pathophysiological response of the tomato plant to infection and symptom development.

Occurrence of new soluble leaf proteins in tobacco after infection with alfalfa mosaic virus

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Up to now there is little evidence that changes in the soluble protein patterns of plants upon infection could have any effect on the recovery phenomenon. This possibility was investigated by analyzing the soluble protein fraction from leaves of *Nicotiana tabacum* L. cv. Xanthi-nc after infection with alfalfa mosaic virus.

Proteins were extracted using 0.1 M Tris-HCl buffer, pH 8.0, which in addition contained ascorbate, cysteine-HCl, and insoluble polyvinylpyrrolidone. The protein patterns were examined by polyacrylamide gel electrophoresis in the presence of SDS (1).

Differences were only recognized in low-molecular-weight proteins. Two days after inoculation an increase in two pre-existing proteins occurred in the inoculated leaves. From the third up to the seventh day two novel proteins appeared with estimated

molecular weights of 15 500 and 14 600. The same changes could be detected in systemically invaded leaves with a delay. The first differences were detectable before symptoms were visible. Recovered leaves, first harvested three weeks after inoculation, showed similar patterns. There was a correlation between increases in the levels of the new proteins and recovery.

In inoculated and recovered leaves the appearance of the newly formed proteins could completely be suppressed by actinomycin D. After 14 days there were only small amounts of these proteins in systemically infected leaves. Plants treated with actinomycin D showed more severe symptoms and did not recover completely.

Although there is no direct evidence for an involvement of the proteins in plant resistance and recovery, they may play a role in the development of these mechanisms.

(1) Laemmli, U.K., 1970. Cleavage of structural proteins during the assembly of the head of bacteriophage T4. Nature 227: 680-685.

Comparison of soluble leaf protein patterns during the first stages of pathogenesis in tobacco ringspot virus-infected tobacco

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Tobacco plants *(Nicotiana tabacum* cv. Xanthi-nc) infected with tobacco ringspot virus develop necrotic ringspots on the inoculated leaves and necrotic line patterns and leaf deformation on the systemically infected leaves.

The pH 8.0-soluble proteins of inoculated and systemically infected leaves were extracted and separated electrophoretically in 11% polyacrylamide gels containing SDS. The soluble leaf protein patterns of the infected plants were compared with those from leaves of corresponding stages of buffer-inoculated plants.

Apart from changes in the intensity of different protein bands of higher molecular weights, no significant alterations in the protein constitution of inoculated leaves could be detected. Electrophoretic separations of extracts from systemically infected leaves showed an increase of a constitutional protein with Rf 0.88 from the seventh to the fourteenth day after inoculation. In addition, a novel protein appeared with an electrophoretic mobility of 0.77.

Further electrophoretic studies at all stages of infection and with special regard to the recovery phenomenon must be made to determine a possible role of the increasing and newly appearing proteins in the recovery stage of pathogenesis.

Occurrence and possible role of thionin-like proteins in apple, tomato, melon and rice seed

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Initial studies focused on revealing the nature of the agglutination of *Erwinia*