C: EPIDEMIOLOGY AND PHYSIOLOGICAL ASPECTS OF DISEASES CAUSED BY BACTERIA AND FUNGI

SURVIVAL AND DISTRIBUTION OF *VERTICILLIUM DAHLIAE* IN THE PROFILE OF LOESSIAL SOIL IN THE NEGEV

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The pathogen *Verticillium dahliae* produces numerous microsclerotia (MS) on potato plants, more in autumn than in spring. Survival of the fungus was compared in soil in the laboratory and in the field by determining fungal populations periodically. In the laboratory a dry soil, naturally infested with *V. dahliae* MS, was stored at 20-28°C. In the field, diseased potato crop residues were disced into soil and the viability of the fungus was determined during several years when the crop rotation consisted of non-host plants only. In the laboratory, a sharp decrease (95%) in viability of MS was observed during the first 2 years; after 3.5 years only 1.5% of MS were viable and after 5 years no viable MS were detected. In the field, viability of the fungal population was maintained longer: 2 and 6 years after the incorporation, 50% and 8%, respectively, of the original population remained viable.

The distribution of the fungal population in the soil profile was tested in four soil depths: 0-10, 10-20, 20-30 and 30-40 cm. After potato harvest and disc incorporation of the residue, 98% of the fungal population found was in the first two soil layers (*i.e.*, 0-20 cm depth). During the years of the successive crop rotation of non-host plants, the proportion of the fungal population in the top layer decreased and the fungus was more equally distributed throughout the entire soil profile examined. *(P)*

INDUCTION OF, AND CROP LOSS DUE TO, CAVITY SPOT OF CARROTS

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Carrots were inoculated with 20 different aerobic and anaerobic bacterial species isolated from the rhizosphere and the surfaces of carrots; none of them induced cavity spot in carrots. Heat, cold, wilting and flooding stresses led to only a low level of induced cavity spot. A combination of at least 6 h flooding and temperatures higher than 27°C clearly induced cavity spots in carrots. Sugars, amino acids and minerals leaked from the carrot after the plant was subjected to flooding and heat. Longer growth periods after stress markedly increased cavity spots in the carrots. The soil types (sand, loess and heavy soil) and several carrot cultivars tested had no marked effect on spot formation. Increased N-fertilization slightly enhanced the "disease." Scanning electron microscopy revealed that after subjecting the carrots to heat and flooding very small cavities were formed under the epidermis and they were free of bacteria. After the epidermis collapsed there was massive multiplication of bacteria, concomitant with cavity appearance. Infected carrots showed moderate protease, pectinase and cellulase specific activities and strong peroxidase and polyphenoloxidase activities as compared with healthy carrots.

The following mechanism is suggested as a working hypothesis for induction of cavity spot of carrots. Physiological stresses cause microscopic damage to carrots and leakage of nutrients to the adjacent rhizosphere. Under these conditions non-specific bacteria developed which caused some limited degradation of the tissue. Their activity induces the defence mechanism of the plant that overcomes and stops the local infection; as a result, a black spot develops. Cavity spots reduce the marketing value of carrots.