Results of the demonstration experiments on controlling the soil-borne pathogens in vegetable crops in Poland

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Abstract

Within the framework of the Life Plus Project, entitled “Sustainable use of chemical fumigants for the control of soil-borne pathogens in the horticultural sector”, three demonstration trials were conducted to evaluate different strategies for controlling soil-borne diseases of greenhouse tomatoes and bell peppers and field-grown cucumber. In the experiment with pepper, the following treatments were included: active soil steaming, dazomet 40 g/m^2, dazomet 40 g/m^2 + *Trichoderma asperellum*, *Brassica carinata* 150 g/m^2, *B. carinata* + *T. asperellum* and untreated control. The best control of Verticillium wilt disease and root rot, caused by a complex of soil-borne pathogens, provided dazomet applied alone or combined with treatment of pepper transplants with *T. asperellum.* The efficacies of active steaming (44.6%) and of *B. carinata* (2.4%) in controlling Verticillium wilt were significantly lower than those of dazomet (89.5–90.8%). In the trial with greenhouse tomatoes, non-grafted and grafted plants were grown in the soil treated with dazomet (30 or 40 g/m^2) and in untreated soil. In the case of grafted tomato plants, no beneficial influence of integrating grafting and soil fumigation on the average number of fruits per plant was observed. In contrast, non-grafted plants responded to soil fumigation with an increase in fruit number in the first two clusters by 10–15%. Soil fumigation in field-grown pickling-type cucumbers with dazomet (400 kg/ha), metam sodium at 600 and 900 l/ha and 1,3-D + chloropicrin (350 and 500 l/ha) provided very good and long-lasting weed control effect. Plant vigour was similar among fumigation treatments and always visibly better than the control. Symptoms of Fusarium wilt of cucumber were evident only in the untreated control, where 16.1% of plants were affected. The highest increase in cucumber yield was obtained after soil treatments with metam sodium at a rate of 600 l/ha (71%) and with 1,3-D + chloropicrin at 500 l/ha (68%). The results obtained indicate that the lower application rates of fumigants were generally as effective as higher ones.