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6-SUMMARY

E.c.carotovora is the causal agent of the soft rot disease of potato tuber in stores and in the field where early decay of mother tubers or seed tuber pieces may occur. Therefore, the aim of the present work is study the pathogenicity of three *E.c.carotovora* isolates on potato slices, carrot and turnip discs. Inhibition of the growth of these isolates by some synthetic and natural compounds was tested *in vivo* and *in vitro*. The effect of the most effective compounds on the fresh weight of potato plants, chlorophyll and carotene contents of their leaves, number and weight of tubers/plant and total sugars (reducing and non-reducing sugars) in tubers was tested under greenhouse conditions.

Pathogenicity studies revealed that on inoculated potato slices, isolate E₁ caused severe soft rot and tissue maceration than E₂ and E₃ isolates which gave moderate soft rot symptoms. Also, E₁ and E₂ isolates caused soft rot symptoms on potato slices, carrot and turnip discs, while E₃ isolate gave symptoms only on potato slices and carrot discs.

Results of the *in vitro* inhibition of the bacterial growth by tested compounds revealed that:

- 1- The antibiotic streptomycin with concentrations ranged from 2 to 128 ppm caused inhibitory effect against E₁, E₂ and E₃ isolates in concentration dependent manner. The isolate E₁ more tolerant to streptomycin than E₂ and E₃ isolates.
- 2- The tested bactericides, streptrol and oxolinic acid were effective against the bacterial isolates with concentrations ranged from 5 to 640 ppm. Again the isolate E₁ more tolerant to the tested bactericides than E₂ and E₃ isolates. Also, streptrol was found to be more effective than oxolinic acid at all concentrations.
- 3- From the tested fungicides, with concentrations ranged from 100 to 6400 ppm, mancozeb was the most suppressive to the growth of *E.c.carotovora* isolates followed by mancozan, copper oxychloride and copper hydroxide. E₁ isolate was more tolerant to the tested fungicides than E₂ and E₃ isolates.
- 4- Different mushroom extracts with concentrations ranged from 500 to 4000 ppm caused significant inhibitory effect on the growth of the most tolerant bacterial isolate E₁ when compared with control. The chloroform extract was the most suppressive extract to the tested bacteria, followed by ether and petroleum ether extracts.

- 5- Different concentrations (4000 to 7000 ppm) of garlic and carnation oils caused inhibitory effect on the growth of soft rot bacteria isolates. E₁ isolate was more tolerant to the tested oils. Garlic oil was more effective against the tested isolates than carnation oil.
- 6- Mixing of garlic oil with a concentration of 1000 ppm with streptrol or oxolinic acid with a concentration of 50 ppm potentiated (increased) the inhibitory effect of both bactericides, while mixing of carnation oil (1000 ppm) or mushroom extracts (100 ppm) with both bactericides (50 ppm) antagonized the effect of both bactericides streptrol or oxolinic acid.

Results of the *in vivo* studies revealed that:

- 1- Streptomycin, streptrol, oxolinic acid, mancopper, mancozan, copper oxychloride and copper hydroxide at concentrations of 32, 20, 20, 400, 800, 1600 and 3200 ppm, respectively, could prevent the development of soft rot on inoculated potato slices with *E.c.carotovora* isolates.
- 2- Chloroform, petroleum ether and ether extracts of field and oyster mushroom at concentrations of 2000, 3000 and 3000 ppm, respectively, prevent the development of soft rot symptoms on inoculated potato slices.
- 3- Garlic and carnation oils at concentration of 6500 ppm for each were effective against the development of soft rot symptoms.

The most effective bactericides (streptrol and oxolinic acid) and fungicides (mancopper and mancozan) were used for treatment of seed potato tubers to detect their effect on resulted potato plants, quality and quantity of potato tubers. Results indicated that:

- 1- The pesticidal treatments caused significant increase in the fresh weight of plants after 45 days from cultivation. Also, these treatments increased significantly total chlorophyll (chlorophyll A and B) and carotene contents in the leaves of these plants. The increase in each parameter was more pronounced in the streptrol treatment.
- 2- The bactericidal treatments increased significantly the number and weight of tubers/plant. Also, these pesticidal treatments increased significantly the total sugars (reducing and non-reducing sugars) in the tubers resulted from these treatments. The increase in the number and weight of tubers/plant and sugar content of these tubers was more pronounced in the streptrol treatment.

The overall results suggest that the three of isolates of *E.c.carotovora* may be differentiated in their sensitivity to synthetic compounds and botanicals. The most tolerant isolate was E₁ isolate and the most effective compounds and

botanicals were streptol and oxolinic acid, from synthetic compounds, and chloroform extract of mushroom from tested botanicals. Garlic oil improved the inhibitory activity of streptol and oxolinic acid against bacterial isolates. This finding is suggested to have an economic and environmental importance. Treatment of seed tubers with streptol or oxolinic acid with a recommended dose, before cultivation in inoculated soil, increased the quantity and quality of resulted tubers.