CHEMICAL ALTERNATIVES OF M BR FOR USE IN GREENHOUSE GROWN LETTUCE IN BELGIUM

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The goal of this project is to manage soil born diseases (fungi, nematodes , weeds) in the greenhouse culture of lettuce in Belgium with soil disinfestation other than MBr.
The chemical approach is part of an integrated project " Altmet " , sponsored by the Federal Government of Belgium; the actual presentation aim tot dissiminate these results to the growers as part of the European Union project " Alterbromide .
Producers of lettuce in greenhouses in Belgium are highly dependent on soil disinfestation: most of these lettuce growers produce lettuce year round; main problems are fungal pathogens like Rhizoctonia solani, Sclerotonia spp., Botrytis cinerea and Pythium spp., and nematodes especially Meloidogyne spp.
Till January 2006, about 70 % of MBr allowed as critical use in Belgium, was applied in greenhouse lettuce.
The main objective of this project was to find effective alternative systems for the control of these key diseases : on the short run to find chemical alternatives and on the long run to find a more durable approach such as biological antagonists, resistant varieties, other cultural practices.
Specific objectives are to demonstrate the performance of chemical alternatives such as products, formerly used on limited scale, Metam sodium, 1.3 Dichloropropene, Chloropicrine, Dazomet and novel products like Methyliodide and Dimethyldisulfide, and of course combination with these products related to their toxicological effects.
These alternative products were applied under doses as indicated by the manufacturer's doses or in combination at half dose rate.
A first experiment was carried out as pot experiment with ground columns 1 m high, 10 cm diameter, existing of 10 plastic pots with perforated bottom, which were pushed together composing 1 column. Sandy loam soil at 75 % WHC was used; the columns were placed at 20°C.
Test organisms were placed at 0, 10, 20, 30 and 40 cm depth; Fungi, originating form a 3 week old culture, containing one or more sclerotia, were packed in filter paper. Meloidogyne incognita containing soil was packed in (5 gram) screenpacks . The same technique was used for tomato and Lepidium seeds. The columns were covered with VIF film.
Products were applied at 20 cm depth, except MBr and MI which were applied immediately under the film at doses Metam sodium 7,5 l, DMDS 8 kg, MI 2 kg, Dazomet (450 gram) dissolved in DD 3,4 l, MBr 4,5, Telopic 4,5 l / are .
After one week the columns were separated in their individual pots ; test organisms were recovered and analyzed for their viability: fungi on PDA-medium in Petri plates, nematodes were extracted via modified Whitehead

method, and seeds were put on wet filter paper. One week later, test crops barley and Lepidium were sown on the individual pots to analyze for remaining phytotoxic effect.
The results are presented in figures indicating % of control at each of the tested depths. Related to R. solani, best results, comparable to MBr, were obtained with Metam sodium , telopic , and Methyliodide ; DMDS was insufficient to kill this fungus. The same trend appears with Sclerotinia sclerotiorum, although this fungus is less sensitive to these products than R. solani.
To control weeds, simulated by using Lepidium seeds and tomato seeds, Lipidium seeds are more sensitive to the products than tomato seeds . Metam sodium, telopic , Dazomet dissolved in DD, MI and DMDS give sufficient effect. The nematode Meloidogyne incognita was easiest to control; Metam sodium, DMDS and telopic gave perfect killing similar to MBr and MI.
The residu effect of the products was most expressed at the level of application, Telopic resulted in the poorest plant development: the results confirm the long after effect of Chloropicrine in the mixture Telopic.
A second experiment was set up to test the influence of different physical soil conditions: the temperature of the soil was 12°C and 20 °C and soil humidity was brought till 40%, 75% and 90% WHC, compared to 20°C and 75% WHC in the first experiment.
Doses applied per are were: Metam sodium 7,5 l, DMDS 8 kg, Methyliodide 4 kg, Dazomet 450 gram /liter, dissolved in DD 3,4 l, MBr 4,5 kg and Telopic 4,5l.
As a result: Rhizoctonia was best controlled with Metam sodium, Methyliodide and Telopic at 12°C, while Sclerotina was inhibited more at 20°C. DMDS had no effect at the applied dose against these fungi.
Evenso for the soil humidity the test fungi reacted different to the WHC of the treated soil.Metam sodium was more efficient at 40% humidity than at 90% humidity against Rhizoctonia; for Methyliodide best results occurred at 90% humidity.
Related to Sclerotonia, less differences were observed depending on soil humidity. To control nematodes (Meloidogyne incognita): no differences could be observed related to these soil conditions: however DMDS was as sufficient as the other products.
As a conclusion , older products like dazomet , telopic , dichloropropene ,metam sodium have good possibilities to replace methylbromide under condition that sufficient information is present on the organisms to be killed and taking into account longer waiting periods after the disinfestations ; on the other hand novel products are very promising : e.g. methyliodide as a general replacement for methylbromide and dimethyldisulphide in the particular case of nematode infestation .