Combination of soil fumigants: Synergistic performance and improved yield

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The currently available fumigants are characterized by a narrow range of controlled pests compared with methyl bromide. Combination of fumigants with different spectrum of target pests can extend the application of these fumigants. Formalin (Fordor, Dor chemicals, Haifa) and metam sodium (MS) are registered in Israel against bacterial and fungal diseases. Combination of the two fumigants can give relief to farmers in potato and peanut fields which are heavily infested by soilborne fungi (*Pythium and Verticillium*) and bacteria (*Streptomyces spp.*).
The objective of this study was to evaluate the performance of MS combined with formalin in controlling soilborne pests in agricultural fields.

In Laboratory studies we found that application of Formalin and MS resulted in a synergistic control of fungal pathogens. It was evident that formalin enhances MS toxicity at low concentration in which MS alone was not effective. Field experiments in small plots showed that combined application of Formalin and MS improved the control of fungal pathogens at reduced dosages and increase mortality in deeper layers.

The effect of combined fumigation was tested in controlling diseases of tomatoes, melons, and potatoes. In all the experiments standard dosages were compared with combination at half and even further reduced dosages. Application of MS at 200 l/ha combined with formalin at 1500 l/h (30% of the standard dosage for each fumigant alone) resulted in effective control of sudden wilt of melons, crown rot of tomatoes, and Verticillium wilt of potatoes. In all the experiments the combination of fumigants resulted in increased yield quality and quantity. Application of formalin and MS was further validated in large commercial fields with successful results.

Application of fumigants can result in synergistic effect of pest control. This enables extending the use of these fumigants in fields with broad spectrum of pests. Also in enables reducing dosage while maintaining high level of control and minimizing negative attributes. Further research should be done in exploring more possibilities of fumigant combinations.