

Phytopathological and nutraceutical evaluation of cauliflower plants treated with high dilutions of arsenic trioxide

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ABSTRACT

Introduction: This research aimed at verifying the effects of highly diluted (HD) treatments on cauliflower (*Brassica oleracea* L.) plants both healthy and inoculated by the fungus *Alternaria brassicicola*, causing the dark leaf spot disease. *In vitro* spore germination assays (A), growth chamber experiments (B) and field trials (C) were performed.

Material and Methods: (A): spore suspensions were prepared in HD treatments and their inhibiting effect on germination was recorded microscopically after incubation at 25°C for 5 h. (B): the same treatments were tested in plants artificially inoculated with the fungus. The infection level on leaves was blindly evaluated by a previously defined infection scale. (C): the field was divided into plots according to a complete randomized block design. In the first trial (i), plants were artificially inoculated and weekly treated; the infection level was evaluated on cauliflower heads. The second trial (ii) was performed on the same field with the aim to induce a natural infection, mediated by infected crop residues. Measurement endpoints concerned the evaluation of some physiological parameters along with the glucosinolate content on cauliflower heads.

Results: (A): arsenic trioxide (As 35x and 35x diluted 1:5000) and *Cuprum* 5x induced highly significant inhibition of germination rate (-60%) vs. control. (B): As 35x and Cu 3 g/l induced a significant decrease of mean infection level (-50%). (C): in (i), a significant reduction of disease symptoms on heads was recorded for As 35x and Cu 3 g/l (-45%). In (ii) natural fungal infection did not occur due to dry weather conditions; physiological and nutraceutical analyses of healthy heads demonstrated that As 35x induced a significant increase of both head size and glucosinolate content.

Discussion: Some evidences on the efficacy of arsenic, at different decimal and centesimal HD, in fungal and viral disease control were previously reported [1]. In the present study the efficacy of HD arsenic in dark leaf spot control in field has been shown for the first time: since fungal inoculation was performed on the leaves before flowering, we can hypothesize that this treatment induced an increase of plant resistance to fungal infection.

Conclusions: This research showed the possibility of using HD arsenic in agriculture (“agrohomeopathy”), as it increased both plant resistance to fungal infection and the content of glucosinolates, ie secondary metabolites involved in plant resistance mechanisms [2] and considered as “plant food protection agents” [3].

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Keywords: cauliflower, arsenic trioxide, *Alternaria brassicicola*, glucosinolates

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