



RESEARCH ARTICLE

APPLICATION OF POTENTISED HOMEOPATHIC MEDICINE ON AGRICULTURE: A REVIEW

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ABSTRACT

Homeopathy not only used as medicines but also applied in agriculture in this modern era. Potentised substance (Arsenic trioxide, Gibberellin acid, Lysine, Sodium Chloride, Copper Chloride) were used in the plant for germination, growth, and development of the plant. Effects were reported with decimal potency levels ranging from 14x to 45x, and centesimal potency levels ranged from 5c to 24c. The studies aimed to understand the effectiveness homeopathic medicine and also identification of therapeutic effect on different plants. These studies allowed extending the boundaries of the practical use of homeopathy including its use in the farming industry. This review covers the use of potentised homeopathic medicine in the agricultural sector.

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INTRODUCTION

Homeopathic potentisation is the process consists of highly diluted substances, such as plant or animal extracts or minerals, which are stepwise diluted and vigorously succussed. Now research in homeopathic potencies is of great interest to organic agriculture since this way of treatment relies totally upon natural substances and essential self-regulation principles. Therefore homeopathic potencies are used by the researcher of all over the world to investigate its utility in organic plant production. However, the primary condition for such use is that plants are not able to react to homeopathic dilutions. Homeopathic potencies involve successive logarithmic dilution steps decimal (1:10), centesimal (1:100) and other diluted potencies. Above a certain dilution step, there are virtually no molecules of the original substance left (potency levels higher than 24x respectively 12c). Ultra-highly diluted (UHD) substances defined as dilutions that are highly unlikely to contain any molecules of the Original material may still yield biological effects (Davenas et al., 1988). Effect of different homeopathic preparations on plant growth studies aimed to rule out the placebo effect from the homeopathic phenomenon, but also at the identification of therapeutic effect on various plants

(Kleijnen et al., 1991, Cucherat et al., 2002, Taylor et al., 2000). These studies allowed extending the boundaries of the practical use of homeopathy including its use in the farming industry. Most criticism concerns whether treatments, in particular, ultra-high dilutions (where the concentration of the original substance is beyond the Avogadro limit) have any real biological effect. Moreover, there is no complete theory to provide a plausible explanation for the action of homeopathic potencies (Chibeni et al., 2001). Primarily on the specific effects of ultra-molecular dilutions (beyond the Avogadro limit) needs to be judged. Homeopathy has always been a subject of discussion, and after the debate has been recently taken up after meta-analysis published in The Lancet (Linde et al., 1997). After this publication, fundamental methodological problems about the meta-analysis have been detected (Rutten et al., 2005). Beneficial effects of different As₂O₃ homeopathic potencies have also been observed in other models based both on plants (Brizzi et al., 2000, Betti et al., 2003). Botanical trials are not susceptible to the placebo effect nor ethical problems and rely on almost inexhaustible sources of biological materials (Betti et al., 2003, Betti et al., 2008). Complementary medicine centers essentially on the specific effects of ultra-molecular dilutions (beyond the Avogadro limit), which are judged to be impossible according to conventional science, although there is emerging evidence for in vitro activity of ultra-high dilutions. (Elia et al., 2007) The current study pea (*Pisum sativum* L.) in hydroponics culture was chosen as an experimental model, as earlier used by many workers (Baumgartner et al., 20014) and

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the effect of medicines was observed on various morphological and photosynthetic activities. The pea seeds were stressed with the different centesimal potency of the well-known homeopathic remedy, Arsenicum album (Swati *et al.*, 2013). In this study, the effect of potentised homeopathic medicines on germination, growth and photosynthetic activity of pea (*Pisum sativum* L.) was investigated as compared to the untreated one (distilled water) (Baumgartner *et al.*, 2004). Homeopathically prepared gibberellic acid was first tested on barley stalk length, with different results (Hamman *et al.*, 2003)

Effect of potentised medicine on plants

Effects of homeopathic medicines on plants, which had been on plant growth purpose, were relevant for this review. The study included experiments with whole plants, parts of plants, plant cells and plant seeds. Different types of such as succussed potentiation medium (i.e. succussed only once), potentised potentiation medium (e.g. water or water-ethanol mixture diluted and succussed in the same way as the potentised test substances), un succussed potentiation medium, diluted test substance, positive control, no treatment are prepared. Four of these reviews are showing positive results that homeopathy does have an effect beyond placebo (Linde *et al.*, 1997, Cucherat *et al.*, 2000). One publication is showing negative result concluding that homeopathy does not have an effect beyond placebo (Shang *et al.*, 2005). Those who have a prior belief that homeopathy cannot work for them the publication shows some evidence (Shang *et al.*, 1998). To get the most accurate result succussed or potentised potentiation medium had to be part of the experiment along with the other four types of controls had been taken due to specific properties of the potentised homeopathic substance. Ethanol treatment condition is considered as the negative control for all samples to verify the stability of the chosen experimental setup.

Test substances: Homeopathic test substances of isopathic approach, i.e. the substance that was used to stress the organisms was applied in potentised form as homeopathic preparation. In most cases tested substance arsenic trioxide (As₂O₃) and some cases test substance like Sodium chloride, Copper chloride, and Potassium dichromate was used.

Tested potency levels: Decimal potency from 5x to 45x and centesimal potency from 5c to 24c were tested. In some studies 45x was tested among other potency levels, in some of these solely 45x.

Effective potency levels: Effects were reported with decimal potency levels ranging from 14x to 45x, centesimal potency levels ranged from 5c to 24c.

Controls: In all studies un succussed water was used as the control. One study succussed water and some studies potentised water were used. In some studies, three different plants (wheat, cress) were used, and five potentised test substances were investigated.

Experiment model: Wheat, cress wheat seedlings with arsenic trioxide and sodium chloride as potentised substance, were utilized for the study. The wheat seedling model stressed with arsenic trioxide and treated with the homeopathic preparation arsenic trioxide 45x, is the most frequently investigated model with impaired plants. Germination rate in another experiment 3 potency levels of arsenic trioxide (40x, 42x, 45x) were repeatedly measured, showed a significant stimulation effect compared to potentised controls. The potency level 30x showed different stimulating and inhibiting effects. All experiments were conducted with *Triticum aestivum* L., potencies of arsenic trioxide (45x) and water (45x) induced an increase in growth and a decrease of variability. Non-potentised high dilutions of arsenic trioxide did not induce relevant results.

Table 1. List of Potentised substance used

Author	Plant	Potentised substance	Tested Potency levels	Effective potency levels
Betti <i>et al</i>	Wheat (<i>Triticum aestivum</i> L.)cv-MEC	Arsenic trioxide (As ₂ O ₃)	45x	45x
Binder <i>et al</i>	Wheat (<i>Triticum aestivum</i> L.)cv-pandas and MEC	Arsenic trioxide (As ₂ O ₃)	45x	45x
Brizzi <i>et al</i>	Wheat (<i>Triticum aestivum</i> L.)cv-MEC	Arsenic trioxide (As ₂ O ₃)	30x,40x,42x,45x	30x,40x,42x,45x
Brizzi <i>et al</i>	Wheat (<i>Triticum aestivum</i> L.)cv- MEC	Arsenic trioxide (As ₂ O ₃)	5x,15x,25x,35x,45x	45x
Brizzi <i>et al</i>	Wheat (<i>Triticum aestivum</i> L. cv- pandas	Arsenic trioxide (As ₂ O ₃)	45x	45x
Kovac <i>et al</i>	Winter wheat cv- Innwalder	Sodium Chloride (NaCl) Copper chloride (CuCl ₂) Potassium dichromate (K ₂ Cr ₂ O ₇)	10x-30x	Not reported
Tighe	Cress (<i>Lepidium sativum</i> L.)	Sodium Chloride (NaCl)	12c,18c,24c	12c,24c
Lehnstein <i>et al</i>	Wheat (<i>Triticum aestivum</i> L. cv- pandas	Arsenic trioxide (As ₂ O ₃)	45x	45x

RESULTS

Potentised substances: Potentised substance arsenic trioxide (As₂O₃) was used with wheat seeds. In one study the experiment was conducted using wheat seeds and three stressors like sodium chloride (NaCl), copper chloride (CuCl₂), potassium dichromate (K₂Cr₂O₇). In the study with cress seeds, sodium chloride (NaCl) and for duckweeds arsenic (AsHNa₂O₄7H₂O) the stressor was used. **Plants:** The most frequently used experimental plant model was the wheat seedling model. The influence of homeopathic potencies on the germination and the growth of seedlings were investigated in wheat seeds (Betti *et al.*, Binder *et al.*, Brizzi *et al.*, Kovac *et al.*, Lehnstein *et al.*). One study was conducted with cress seeds (Tighe *et al.*, 2005) with duckweed and with white mustard.

External reproducibility of this model was studied in another laboratory by a Swiss-German research team. Investigations were carried out with two different lots of wheat cultivars treated with arsenic trioxide (45x). They performed three further series of independent reproduction trials to test these hypotheses empirically. First, the experimenter of the previous study of the Swiss-German research team reconsidered an experimental series in the Italian laboratory. Another experimenter of the Swiss-German research team conducted two further series in the Swiss lab with the same wheat cultivar as in the two sets of the previous study. All three series revealed no significant effects of arsenic trioxide (45x). Summarizing, the Italian group observed an increase in shoot length and germination rate, while the Swiss-German group observed a decrease in shoot length and germination rate. The latest experiments with the arsenic trioxide on the wheat seedling model were carried out by the Italian team to evaluate

effects of temperature and aging on the efficacy of arsenic trioxide (45x) on Pandas wheat cultivar seeds. In another experiment was conducted with cress seeds (*Lepidium sativum* L.) stressed by watering in sodium chloride solution for 16 h. After seeds were treated with sodium chloride (12c, 18c and 24c). After 96h of incubation, the germination rate and length of seedlings were assessed.

DISCUSSION

The sodium chloride cress seedling model showed growth increasing effects, whereas the arsenic trioxide wheat seedling model showed increasing and decreasing effects. Based on the assumption that a characteristic feature of homeopathic preparations is to induce equilibrating effects, test systems with impaired organisms can be hypothesized to yield more stable as well as more pronounced effects after application of homeopathic preparations compared to test systems using healthy plants. Apart from one study, where no specific effects of the homeopathic treatment were observed, one other plant study showed more pronounced effects with stressed organisms compared to healthy organisms. In consequence of the equilibrating character of homeopathic preparations on test systems with impaired plants, one may expect that all active potency levels act in the same direction, e.g. growth promoting in a system where the stress induces a growth reduction. This opens the possibility of pooling data from several different potencies which in turn might yield more stable effects. Germination, in turn, is an exceptional period in a lifetime of plants. Growth, which is depending on storage substance, is very fast at this time. Thus the choice of the developmental phase of the organism (germination, growth, etc.), the choice of the stressor as well as its application in time and the time points of observation have to be carefully observed. The choice of the homeopathic by stressing plants new approaches develop, primarily the isopathic application, which might be a good starting point for tuning the experimental parameters to maximize the effect size. After optimization of the experimental parameters, a screening of multiple test substances could be performed to identify homeopathic test substance with stronger effects. The origin and production method of test substances should also be considered. For example, homeopathic arsenic trioxide as used in the isopathic studies identified in this review was always prepared from a 0.1% aqueous solution as mother tincture, which was further potentised in water.

Conclusion

Homeopathic basic research models using impaired plants are usually short term, allowing large numbers of experimental replications, and eliminate disadvantages such as the placebo effect or ethical concerns. They provide the opportunity of studying the presumed characteristic equilibrating (regulative) effects of homeopathic medicines, and at the same time, the stress applied may allow stabilizing the test system. Results of the studies included in this review support the notion that the plant models are useful tools to investigate the controversial aspects of homeopathic preparations. Furthermore, this type of basic research model may be used for investigations of the mode of action and may develop a method to study the stability of homeopathic preparations against external influences and to compare different production methods. It is necessary to further improve the quality of the experimental design, by blinding, randomization, statistical analysis, and appropriate controls to

identify specific remedy effects and to enable replication. Furthermore, the use of systematic negative control experiments is strongly recommended to control system stability.

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