

The Effect Ninhydrin Adduct with Dibuthyltin Chloride $C_6H_4(CO)_2CO \cdot SnBu_2Cl_2$ on the Biochemical Composition and Growth of Chrysanthemum in Vitro

Eugenia HARSAN¹⁾, Luminița SILAGHI-DUMITRESCU²⁾,
Carmen SOCACIU³⁾, Lenuța Mirela CHIS¹⁾, Alpar Peter SOMSAI¹⁾

¹⁾ Fruit Research Station Cluj, Horticultorilor street, no 5, 400457; harsane@yahoo.com

²⁾ Babes- Bolyai University, Cluj-Napoca

³⁾ University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca

Abstract. This study focuses on the effects of applying ninhydrin adduct with dibuthyltin chloride $C_6H_4(CO)_2CO \cdot SnBu_2Cl_2$ on the biochemical composition and growth of chrysanthemum microcutting in vitro. The effects adduct of the dibuthyltin chloride with ninhydrin and the effects of ninhydrin on the untreated control were compared. The effect was observed by biochemical analysis: amount of dry substance, total chlorophyll, total carotenoids, and total proteins. The presence of the chemical compounds the ninhydrin adduct with dibuthyltin chloride and the ninhydrin induces the accumulation of dry substance. Photosynthesis processes are affected, the amount of chlorophyll and carotenoids are both diminished for the treated plants in comparison to the control (between 30 and 60% lower). The ninhydrin adduct with dibuthyltin chloride increases the amount of protein. The effects of the compound over the rhizogenesis are quite interesting. While the ninhydrin acts as a stimulator, the ninhydrin adduct with dibuthyltin chloride acts as an inhibitor. The number of produced green shoots is strongly increased by the ninhydrin adduct with dibuthyltin chloride.

Keywords: $C_6H_4(CO)_2CO \cdot SnBu_2Cl_2$, chrysanthemum, in vitro, effect.

INTRODUCTION

Many organotin compounds are toxic to various organisms and they are used to a limited but significant extent as biocidal agents in agriculture and technology (Harsan *et al.*, 2003, Harsan *et al.*, 2007). There are compared the effects on *in vitro* cultivated *Chrysanthemum sp.* of synthesized organotin compounds with the ligand used in its synthesis in vitro (Kurtz *et al.*, 1991.). The used medium was Murashige- Skoog at pH 5,7 (Holdgate, 1977).

MATERIALS AND METHODS

The effects of the ninhydrin adduct with dibuthyltin chloride $C_6H_4(CO)_2CO \cdot SnBu_2Cl_2$ were tested on microcuttings of the Escort chrysanthemum varieties. The effect of the ninhydrin adduct with dibuthyltin chloride and for the ninhydrin was tested for three concentrations: 0.5, 1.0 and 1.5mg/100ml of medium. For each of the variants there were used nine microcuttings. The action of the compound was compared with the control.

After two weeks the biochemical effects were analysed: amount of dry substance, total chlorophyll, total carotenoids, and total proteins (Burnea *et al.*, 1977).

The amount of dry matter was determined by drying at 105 C and arriving at a constant weight. The amounts of chlorophyll and carotenoids were determined by

spectrophotometry. The total amount of protein was determined by using the Lowry method. The ninhydrin adduct with dibuthyltin chloride and the ninhydrin that were applied in the three concentrations 0.5, 1.0 and 1.5mg/100ml of medium had these effects:

a) The amount of dry substance increased significantly (Fig. 1) when in both variants. When applying ninhydrin adduct with dibuthyltin chloride the amount of dry matter increased by 188 to 288%. When applying ninhydrin the increase of dry matter was of 145 to 165%. This increase can be attributed either to the modification of the hydric balance or to the stimulation of the organically biosynthesis. The organotin compound has a greater effect thus highlighting the important of the organotin fraction.

b) The chlorophyll biosynthesis is inhibited by the organotin compound by 44 to 70% and only lightly by the ninhydrin in comparison with the control (Fig. 2). The effect of applying the ninhydrin adduct with dibuthyltin chloride is stronger when applied in bigger concentration (1.5 mg/100 ml medium), in comparison with both the control and the ninhydrin.

c) The carotenoids biosynthesis is also inhibited by both chemical compounds. The organotin compound has a greater inhibitory effect (Fig. 3) in the 1.5 mg/100 ml of medium, 68% less than the control and 48% less than the ninhydrin. The ninhydrin effect was an inhibition of the carotenoids synthesis of 28 to 56% compared to the control.

d) The effect of the organotin compound on the protein synthesis more obvious in a smaller concentration (0.5 mg/100 ml of medium), which is already 64% more than the untreated control (Fig. 4). The ninhydrin acts as an inhibitor in the protein biosynthesis with 40 to 55% less protein in comparison to the control.

e) The rhizogenesis is directly affected by the adduct in comparison with the ninhydrin (fig. 5). The ninhydrin adduct with dibuthyltin chloride inhibits this process. The most visible effect is at the 1.0 mg/100 ml concentration (74% less than the control). The ninhydrin only inhibits the rizogenesys in the lowest concentration of 0.5 mg/100 ml (37% less than the control), but it actually stimulates it at 1.0 and 1.5 mg/100 ml of medium (the strongest effect is at 1.0 mg/100 ml with 41% more than the control).

f) The roots elongation is inhibited by both compounds. The effect is more visible for the organotin compound with an inhibition of up to 97.5% in comparison with the control in the 1.0 mg/100 ml of medium concentration (Fig. 6). This is another case where the action of the organotin halogen fraction is obvious, with values that are 41 to 95% bigger than the ninhydrin.

g) The number of green shoots production is strongly inhibited by the organotin compound, with up to 85% less production than the control in the 0.5 mg/100 ml of medium concentration. The ninhydrin treated microcuttings have about the same number of green shoots as the control (Fig. 7)

CONCLUSION

The presence of both compounds, the ninhydrin adduct with dibuthyltin chloride and the ninhydrin increases the dry matter amount.

The photosynthesis processes are affected, by inhibiting the production of both chlorophyll and carotenoids in comparison with the control (between 30 and 60% lower).

The ninhydrin adduct with dibuthyltin chloride stimulates the production of protein.

The effect of both compounds on the rhizogenesys is quite interesting. While the ninhydrin stimulates it, the ninhydrin adduct with dibuthyltin chloride has an inhibitory effect.

The green shoots production is strongly affected by the ninhydrin adduct with

dibuthyltin chloride. This can be used in horticulture to control the green shoots production.

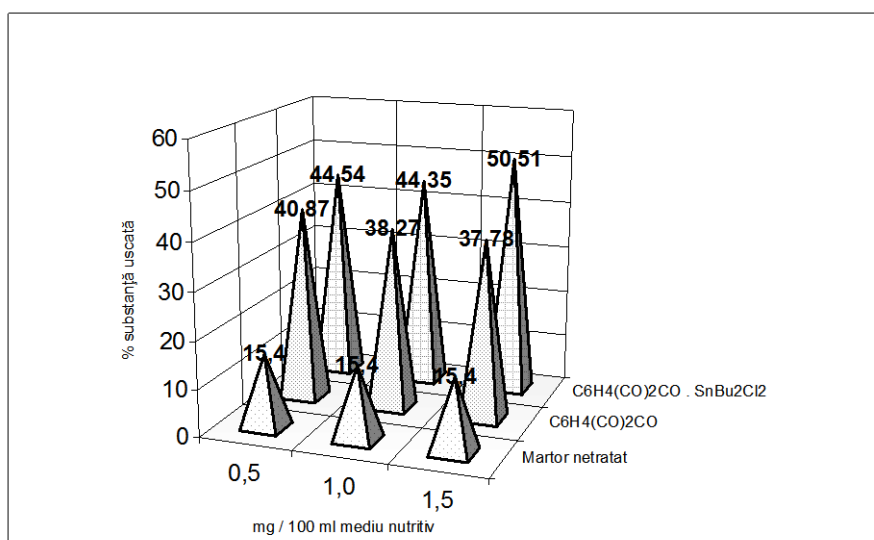


Fig.1. The dry substance contents in chrysanthemum microcuttings under the effect of ninhydrin adduct with dibuthyltin chloride $C_6H_4(CO)_2CO \cdot SnBu_2Cl_2$

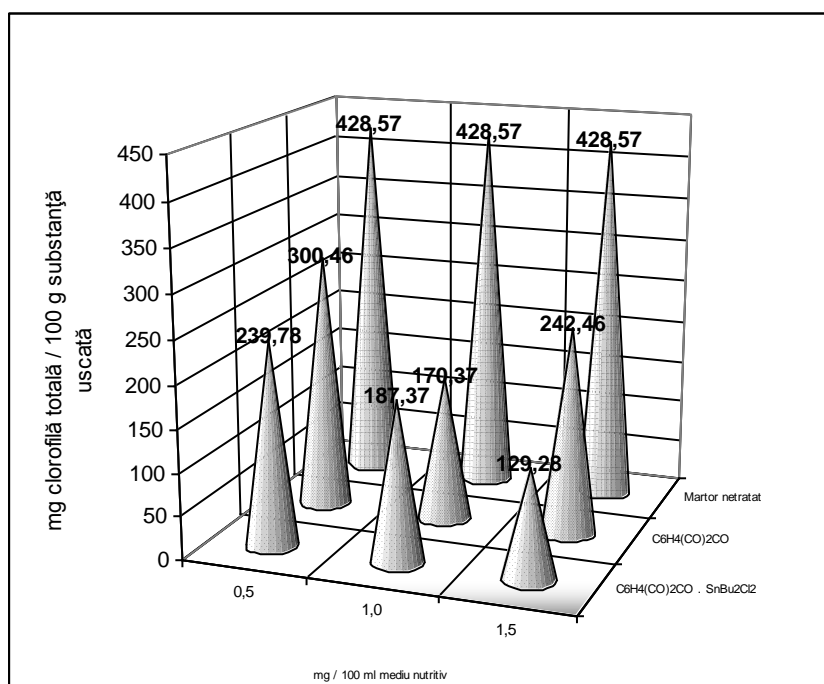


Fig. 2. The chlorophyll contents in chrysanthemum microcuttings under the effect of ninhydrin adduct with dibuthyltin chloride $C_6H_4(CO)_2CO \cdot SnBu_2Cl_2$

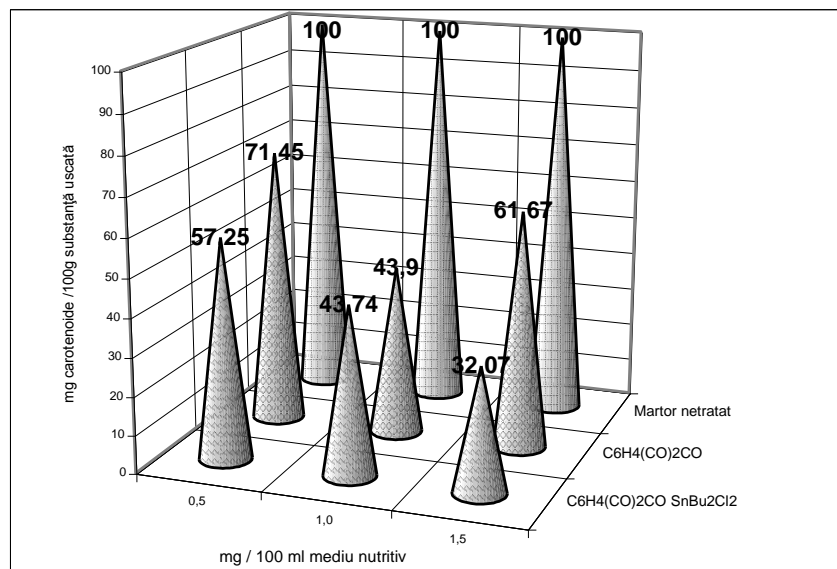


Fig. 3. The carotenoids contents in chrysanthemum microcuttings under the effect of ninhydrin adduct with dibuthyltin chloride $C_6H_4(CO)_2CO.SnBu_2Cl_2$

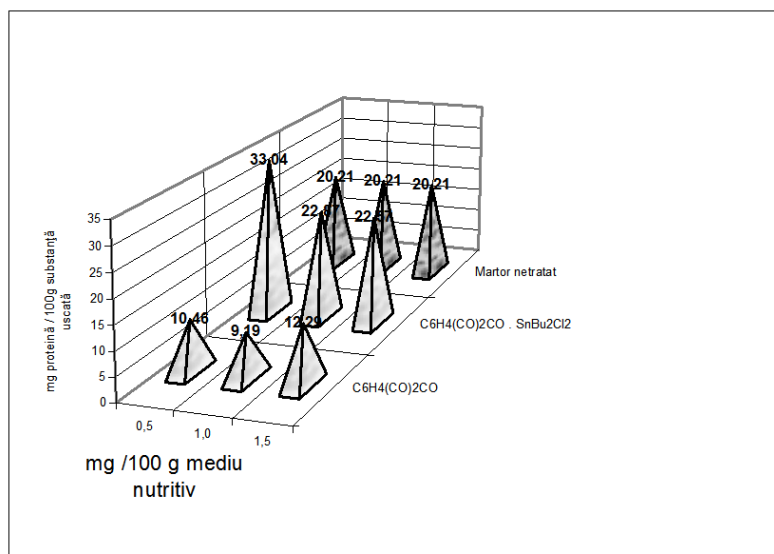


Fig. 4. The protein contents in chrysanthemum microcuttings under the effect of ninhydrin adduct with dibuthyltin chloride $C_6H_4(CO)_2CO.SnBu_2Cl_2$

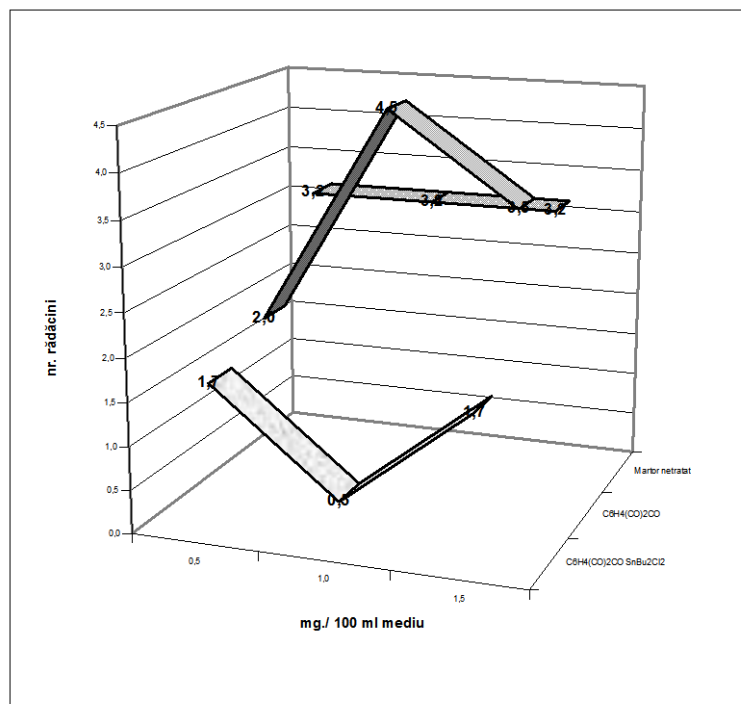


Fig. 5. The effect of treating chrysanthemum microcuttings with the ninhydrin adduct with dibutyltin chloride $C_6H_4(CO)_2CO.SnBu_2Cl_2$ on the number of roots

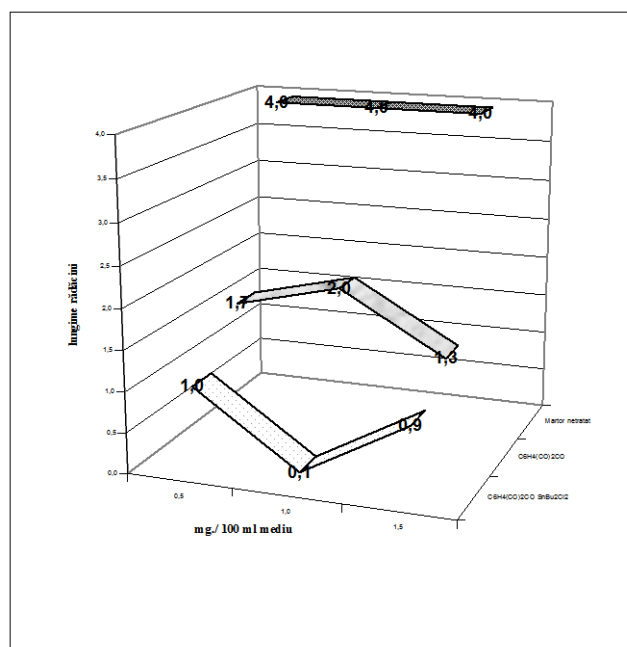


Fig. 6. The effect of treating chrysanthemum microcuttings with the ninhydrin adduct with dibutyltin chloride $C_6H_4(CO)_2CO.SnBu_2Cl_2$ on the length of the roots

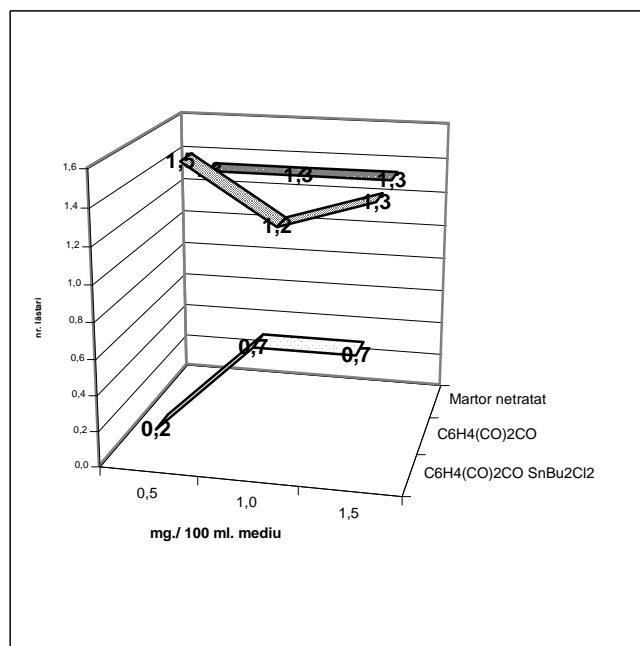


Fig. 7. The effect of treating chrysanthemum microcuttings with the ninhydrin adduct with dibutyltin chloride $C_6H_4(CO)_2CO.SnBu_2Cl_2$ on the number of green shoots production

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