

POTENTIAL APPLICATIONS OF WASTES FROM ENERGY AND FORESTRY INDUSTRY IN PLANT TISSUE CULTURE

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INTRODUCTIONS

Polyphenolic compound are the most important classes of secondary metabolites that play an important role in the biosynthesis process. Natural bioactive compounds have a broad spectrum of both the plant as a whole and on tissues and organs, interfering in the metabolic processes. Through, the characteristic biological activity, natural polyphenols are essential compounds in the stimulation of plants growth and development. The stimulation or inhibition capacities on the plant growth and development is closely correlated with concentrations of polyphenolic compounds applied. The aim of this study was to evaluate the effect of spruce bark aqueous extract and deuterium depleted water (DDW) as bioregulators on the callus development *Zea mays* L. The following specific parameters were closely monitored: fresh biomass accumulation, adventitious roots and aerial adventitious roots organogenesis and the formation of new callus.

Materials

Deuterium depleted water or light water is a distilled water microbiologically pure, with an isotopic concentration of 25 ppm, obtained by isotopic distillation, in vacuum, of natural water with an isotopic concentration of 145 ppm D / (D + H) was purchased from INCDTCI Râmnicu Vâlcea, Romania.

To obtain an **aqueous polyphenolic extract** the spruce bark of industrial origin was used as a vegetable raw material. The polyphenolic aqueous extract it was characterized in terms polyphenols total contents. Thus, for 1 g vegetal material in 100 ml distilled water was recorded 130 mg / L total content in polyphenols

Methods

- Ground spruce bark was subjected to extraction using procedure properly on aqueous extraction
- In MS culture medium (Murashige – Skoog 1962) water (V0) was replaced with deuterium depleted water (V1), deuterium depleted water in combination with spruce bark extract (V2), spruce bark extract – 25 mg GAE/100g (V3) and spruce bark extract without 2, 4 D (V4).

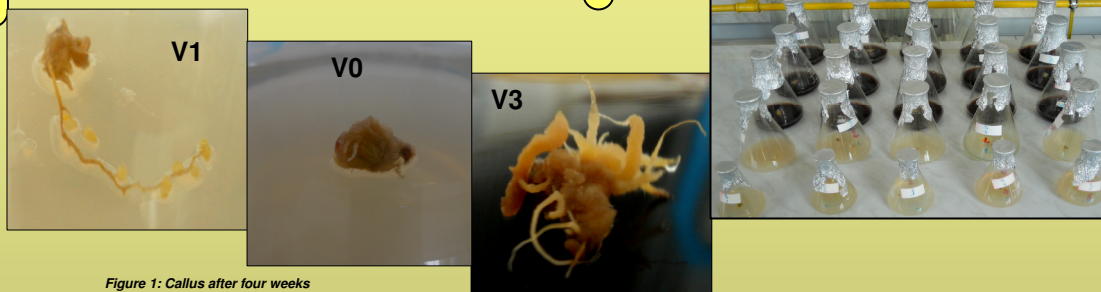


Figure 1: Callus after four weeks

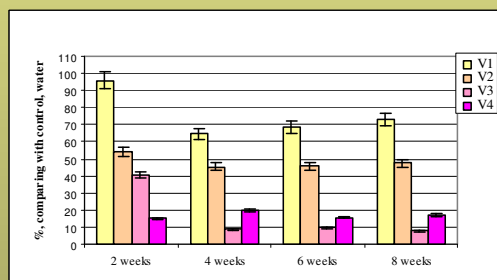


Fig. 2. The influence of DDW and spruce bark aqueous extract in combination with DDW on fresh biomass accumulation in calus of *Zea mays* L.

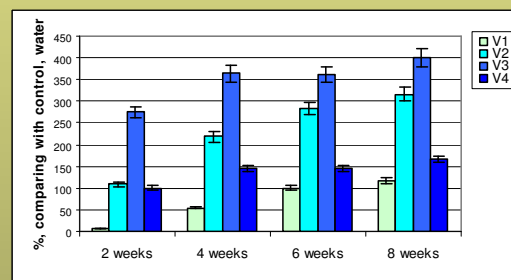


Fig. 3. The influence of DDW and spruce bark aqueous extract in combination with DDW on adventitious roots number

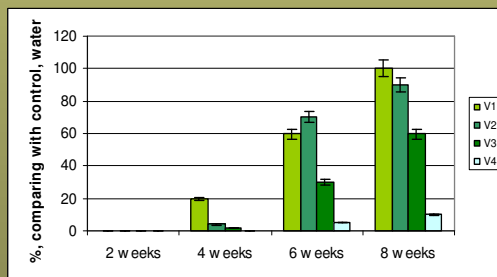


Fig. 4. The influence of DDW and spruce bark aqueous extract in combination with DDW on aerial roots number

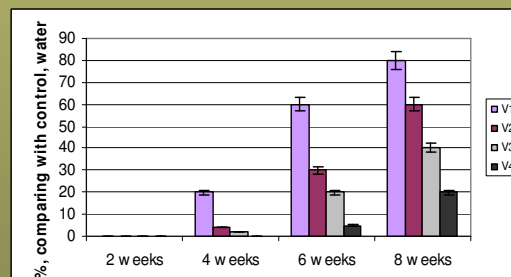


Fig. 5. The influence of DDW and spruce bark aqueous extract in combination with DDW on new callus formation of adventitious roots

The results shown that the highest stimulating effect on biomass accumulation was registered in the presence of deuterium depleted water and in combination with spruce bark aqueous extract (Fig. 2). For adventitious roots organogenesis it was observed that the spruce bark extract (V2, V3) favors their formation, comparing with control (Fig. 3). New callus formation of adventitious roots was recorded in V1 and V2 variants. From presented data we can say that there are sufficient arguments to state that polyphenolic products and deuterium depleted water can act as allelochemicals. The results shown, that the tested solutions stimulated fresh biomass accumulation, adventitious roots organogenesis (Fig. 4) and formation of new callus (Fig. 5), comparing with Control. The most significant stimulatory effect on callus biomass accumulation was identified in the case when the deuterium depleted water and spruce bark polyphenolic extract in combination with DDW, was used for the treatments.

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