



# Is low-dose Gamma irradiation an effective elicitor in stimulating biomass and secondary metabolites production in callus cultures? A case study using *Cotinus coggygia*

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## INTRODUCTION & OBJECTIVE

### INTRODUCTION

*Cotinus coggygia* Scop. (smoke tree) is a widespread shrub species in Europe and Asia, recognized as having antioxidant, antimicrobial, antiviral and anti-inflammatory effects due to its rich composition of secondary metabolites. Recent studies have shown that low-dose Gamma irradiation (<1 kGy) is a useful tool for enhancing the production of secondary metabolites in plant cell cultures.

### OBJECTIVE

Biotechnological and biochemical characterization of the effects of low-dose Gamma irradiation (15, 20, 25, 30, 35, 40 Gy) on a highly proliferative cell line of *Cotinus coggygia* callus obtained in our lab (\*Patent pending).

## EXPERIMENTAL OUTLINE

1. Callus culture

2. Gamma irradiation

3. Growth rate & Dry weight evaluation

4. Secondary metabolites & Antioxidant activity evaluation

Fig. 1 - Experimental flow chart. Callus culture was obtained from seedlings. Biotechnological analysis (growth rate and dry weight) and biochemical analysis (polyphenols, flavonoids and anthocyanins' content, antioxidant activity) were performed on the 19<sup>th</sup> day post irradiation.



Fig. 2 - *Cotinus coggygia* callus

## RESULTS

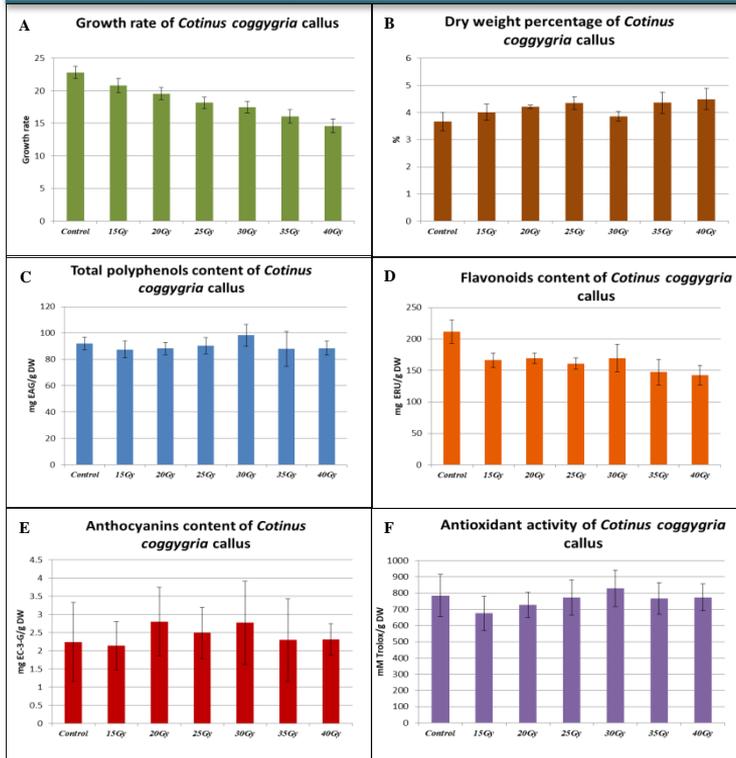


Fig. 3 - Biotechnological (A, B) and biochemical (C-F) results post-irradiation

## DISCUSSIONS & CONCLUSIONS

### DISCUSSIONS

- Growth rate significantly decreased at doses higher than 20 Gy (Fig. 3A), but dry weight significantly increased in 20, 25 and 40 Gy variants (Fig. 3B), suggesting a dehydration caused by irradiation;
- Of all treatments, the highest content of polyphenols and antioxidant activity was registered for the 30 Gy variant (Fig. 3C & Fig. 3F), where dry weight content was similar to control (Fig. 3B);
- The 15 Gy variant registered the lowest content of polyphenols, anthocyanins and antioxidant activity (Fig. 3C & Fig. 3E & Fig. 3F);
- The flavonoids' content was similar in 20 and 30 Gy variants, which displayed different percentages in dry weight (Fig. 3D & Fig. 3B).

### CONCLUSIONS

Low-dose Gamma irradiation treatments **did not** exert significantly stimulative effects on biomass production and secondary metabolites accumulation compared to control samples, most probably due to the diminished callus biomass and high dry weight content in irradiated samples.

## ACKNOWLEDGEMENTS & REFERENCES

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### REFERENCES

\* OSIM Romanian Patent Application A/00837/17.12.2020