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Effects of low-energy electron radiation on the growth and microflora of potatoes

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Diseases of agricultural crops

Potato Black Scab (*R. Solani*)

Fusariosis of potatoes and flax

Ionizing radiation application

- Extension of product shelf life;
- Slowing down the ripening of vegetables and fruits;
- Extermination of parasites and pathogenic microflora;
- Phytosanitary treatment.

Sources of natural ionizing radiation

- **Electronic radiation with an energy of not more than 10 MeV;**
- **ϒ-radiation of Co-60 and Cs -137**
- **Bremsstrahlung generated by accelerators with energies not exceeding 5 MeV**

Purpose of the study

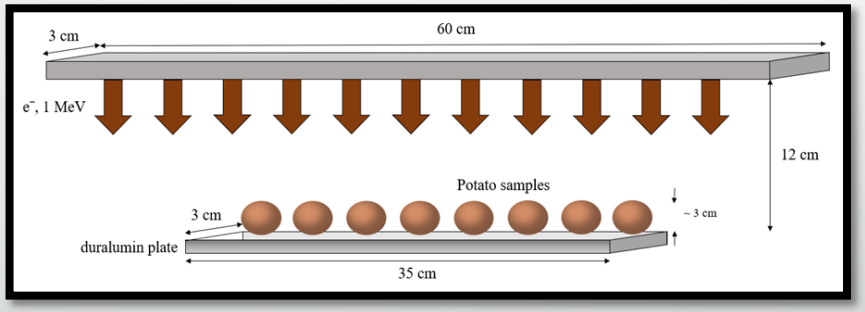
Investigation of the influence of low-energy electron radiation on the productivity and phenology of potatoes infected with Rhizoctonia solani Kühn (R.Solani)

Research progress

Potato tubers infected with R. Solani

Irradiation of an agricultural crop with linear electron accelerator UELR-1-25-T-001 with 1 MeV energy

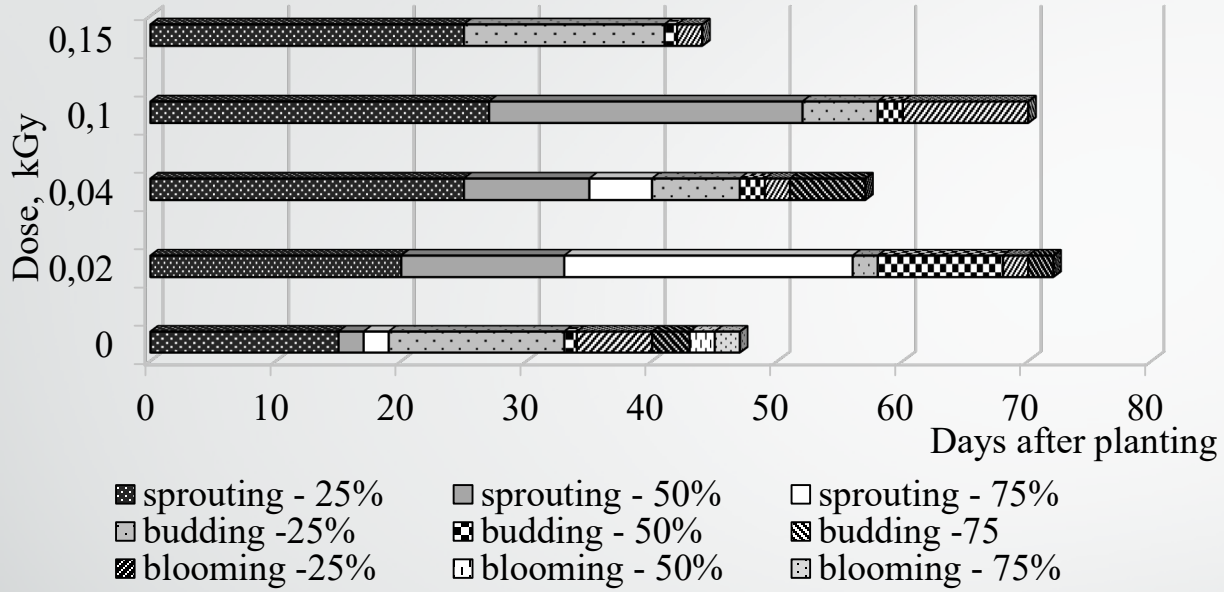
Dose:
20 - 200 Gray



Monitoring of growth and phytosanitary state of plants

Analysis of the obtained results

Results



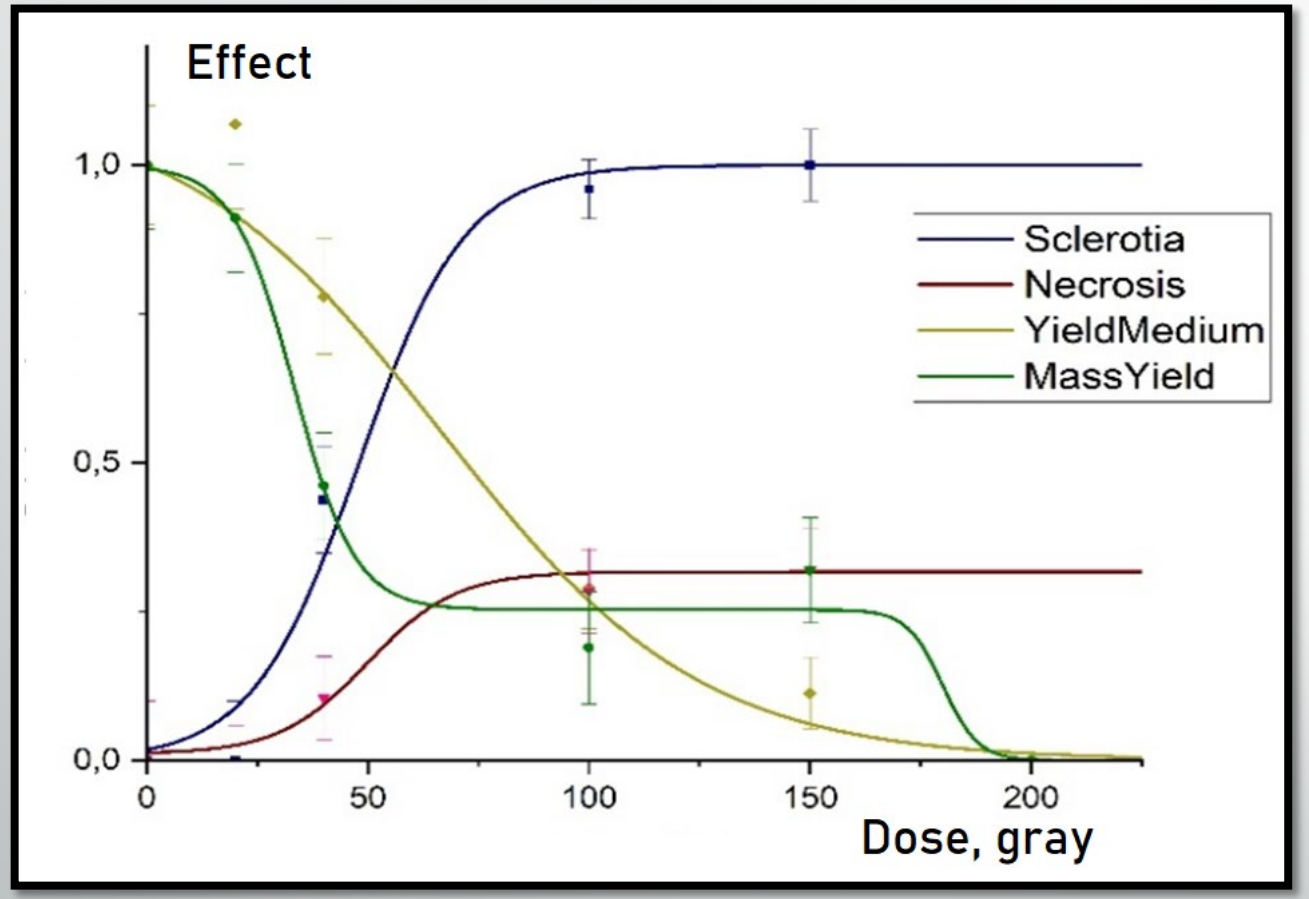
Fractions of the harvested crop:

- Small - up to 40 grams;
- Medium - from 40 to 80 grams;
- Large - more than 80 grams.

Histogram of the dependence of the rate of onset of crop growth phases on the dose

Harvest

Results



Dose dependence of effect on crop/phytopathogen

General dependency formula

$$U(D) = \frac{a}{1 + e^{b*(D-c)}} + f$$

a – the maximum value of the function;
b – the width of the distribution of the function;
c - the dose at with the value of the function decreases by 2 times;
f - resistant to the treatment part.

Conclusion

- Irradiation at doses of more than 200 Gy led to complete inhibition of tuber germination;
- Irradiation of tubers at a dose of 150 Gy leads to the suppression of all diseases except for necrosis;
- Irradiation at a dose of 30 Gy reduces the incidence of tubers by half with only a partial decrease in potato yield, which makes it effective for monitoring the phytosanitary status of a new crop.

Thanks for the attention!