

## ALLELOPATHIC PROPERTIES OF SECONDARY METABOLITES IN WOOD PLANTS

*Evdokimova Daria Pavlovna* a first year post graduate student of Russian State Agrarian University - Moscow Timiryazev Agricultural Academy, the faculty of Agronomy and Biotechnology, the department of Plant Physiology, [extreeme\\_1994@mail.ru](mailto:extreeme_1994@mail.ru)

English supervisor - *Fomina Tatyana Nikolaevna*, associate professor, the department of Foreign Languages, Russian State Agrarian University - Moscow Timiryazev Agricultural Academy, [tfomina67@mail.ru](mailto:tfomina67@mail.ru)

**Abstract:** изучено влияние различных концентраций водных экстрактов из листьев древесных растений представителей родов *Populus*, *Salix* и *Aesculus* на травянистые растения.

**Keywords:** wood plants, secondary metabolites, allelopathy

### Introduction.

In the process of evolution plants competing with each other in ecosystems have developed means of protection with the help of chemicals. Such interaction of plants by the release of biologically active substances into the external environment is called allelopathy (Fig 1).

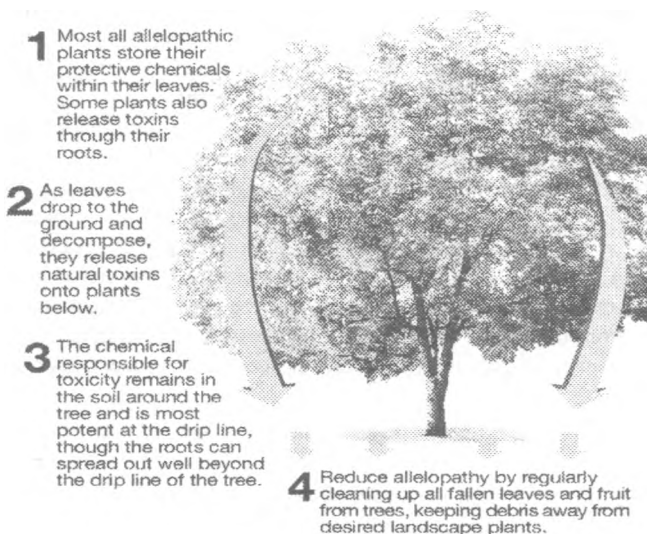


Fig 1 Allelopathy of woody plants

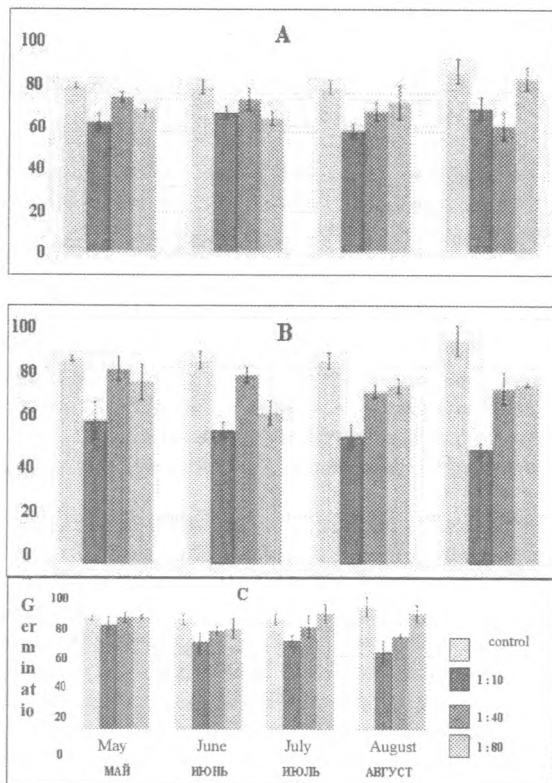
The term "allelopathy" was introduced by Viennese physiologist G. Molish in 1937 [1]. Later, E. Rice A.M. Grodzinski, Naumov and other scientists formed an independent field of plant physiology - allelopathy. The classification of allelopathically active substances has been developed in detail, the mechanisms of their action are known, and the work on studying the allelopathic activity of medicinal plants is widely disseminated.

In the process of growth and development of the plant, various chemical compounds, called secondary metabolites, are synthesized, since they do not participate in growth, development or reproduction. The formation, accumulation and release of these compounds is one of several complex survival strategies in the plant world [3]. These compounds and their functions have not been studied sufficiently, because of the complex chemical structure and pathways of biosynthesis of these substances. Therefore, there was an opinion about their insignificant role in the vital activity of the plant organism [2]. But, thanks to the possibility of laboratory and industrial chemical synthesis of such compounds, they began to be used as growth regulators, in plant protection (insecticides, herbicides) and medicine. The spectrum of biological effects that these compounds exert on other organisms is very diverse. Therefore, special attention is currently paid to the study of the functions of these compounds in the donor plants themselves, but especially in the context of ecological relationships with other species.

#### Materials and methods.

The objects of the research were *Salix fragilis*, *Populus tremuloides* and *Aesculus hippocastanum*. Allelopathic activity of plant extracts of woody plants was carried out using biotests. *Trifolium pratense* and *Poa pratensis* were used as test plants. To obtain the extracts leaves of the woody plants were ground in a ratio of 10 grams of leaves per 100 ml of water (1:10). The resulting base extract was further diluted to concentrations of 1:10, 1:40, and 1:80. In the Petri dishes 10 ml of extracts and 50 seeds of the test of plants are introduced, in the control there was distilled water. As the evaluation criteria, germination energy, germination capacity and length of germinal roots, hypocotyl and coleoptile were used.

Our results showed that extracts of the leaves of *Populus tremuloides* had the strongest inhibitory effect on the energy of germination of clover seeds at a concentration of 1: 10, and an intensifying inhibitory effect occurred in the leaf ontogeny from May to August (Fig. 2B). A similar effect was noted in the action of the extract from the leaves of *Salix fragilis*, but the negative effect was weaker (Fig 2A). Extract from the leaves of *Aesculus hippocastanum* did not show an inhibitory effect on the energy of germination of clover seeds at a concentration of 1:80 (Fig. 2C).



**Fig. 2 Influence of water extracts from leaves of willow (A), poplar (B) and horse chestnut (C) on the energy of germination of clover seeds**

### Results.

In addition, the negative allelopathic effect of the components of poplar leaves and willow on the energy of germination of clover seeds was constant throughout the summer period, whereas in horse chestnut with age of leaves it gradually decreased.

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