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ALLELOPATIC EFFECT OF LECTIN-CONTAINING EXTRACTS OF MEDICINAL PLANTS

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Summary. Model studies of the influence of lectin-containing extracts of medicinal plants St. John's wort (*Hypericum perforatum* L.), common yarrow (*Achillea millefolium* L.), common marigold (*Calendula officinalis* L.) and dwarf evergreen (*Helichrysum arenarium* (L.) Moench.) on the growth and development of wheat, oat, barley and rye at the beginning of their ontogenesis. They testify to the specificity of the action of extracts in relation to model objects, which is probably related to phytochemical components and agglutinins of medicinal plants.

Keywords: agglutinins, medicinal plants, extracts, *Hypericum perforatum* L., *Achillea millefolium* L., *Calendula officinalis* L., *Helichrysum arenarium* (L.) Moench.

It is known that medicinal plants contain a large number of agglutinins of different specificity [4,5] and a wide range of activity [6]. At the same time, it is known that some medicinal plants have great allelopathic potential [1,2,7], which makes it possible to use them as stimulators of plant growth and development. It is likely that lectins, due to their properties, play a certain role in the specific penetration of substances into the cell of the acceptor plant.

That is why, in model experiments, we studied the effect of lectin-containing extracts of medicinal plants: St. John's wort (*Hypericum perforatum* L.), common yarrow (*Achillea millefolium* L.), common marigold (*Calendula officinalis* L.) and dwarf everlast (*Helichrysum arenarium* (L.) Moench.) on the growth and development of wheat, oat, barley and rye at the beginning of their ontogenesis. For this, the seeds of these crops were laid out on filter paper, which was rolled up and placed in laboratory beakers. Plant extracts (1:20 in physiological solution) were poured into glasses in 100 ml portions and this volume was maintained during the experiment. Control – pure physiological solution. After 15 days, the height of the plants was measured, and the biomass of the aerial part and roots was determined (Fig.1). In

addition, the amount of chlorophyll "a+b" and the amount of carotenoids in the leaves were determined (Fig.2).

The obtained data (Fig. 1,2) allow us to draw a general conclusion that the extracts of medicinal plants acted specifically on the growth and development of cereals. Extract from St. John's wort inhibited the growth of oats and wheat and significantly inhibited the growth of the root system of oat (by 50.7%), slower – growth of wheat (by 26.4%) and barley (by 6.9%). At the same time, it had a positive effect on rye on all the indicators studied, especially on the development of the root system (stimulation by 2 times). Due to inhibition of oat growth, the amount of pigments in the leaves significantly exceeded the control.

The extract of yarrow grass had a positive effect on the development of roots and the content of chlorophyll and carotenoids in the leaves of all crops. It is worth noting that the best growth of roots was observed in rye (by 139%), but the extract inhibited their growth in oat (-13.4%).

A similar regularity was also observed in the effect on plants of the extract of marigold. In all cases, it stimulated the development of aerial mass and caused an increase in pigments in the leaves. Interestingly, the extract inhibited root growth of all crops (-22.4% - 31.4%), except for rye (+52.2%).

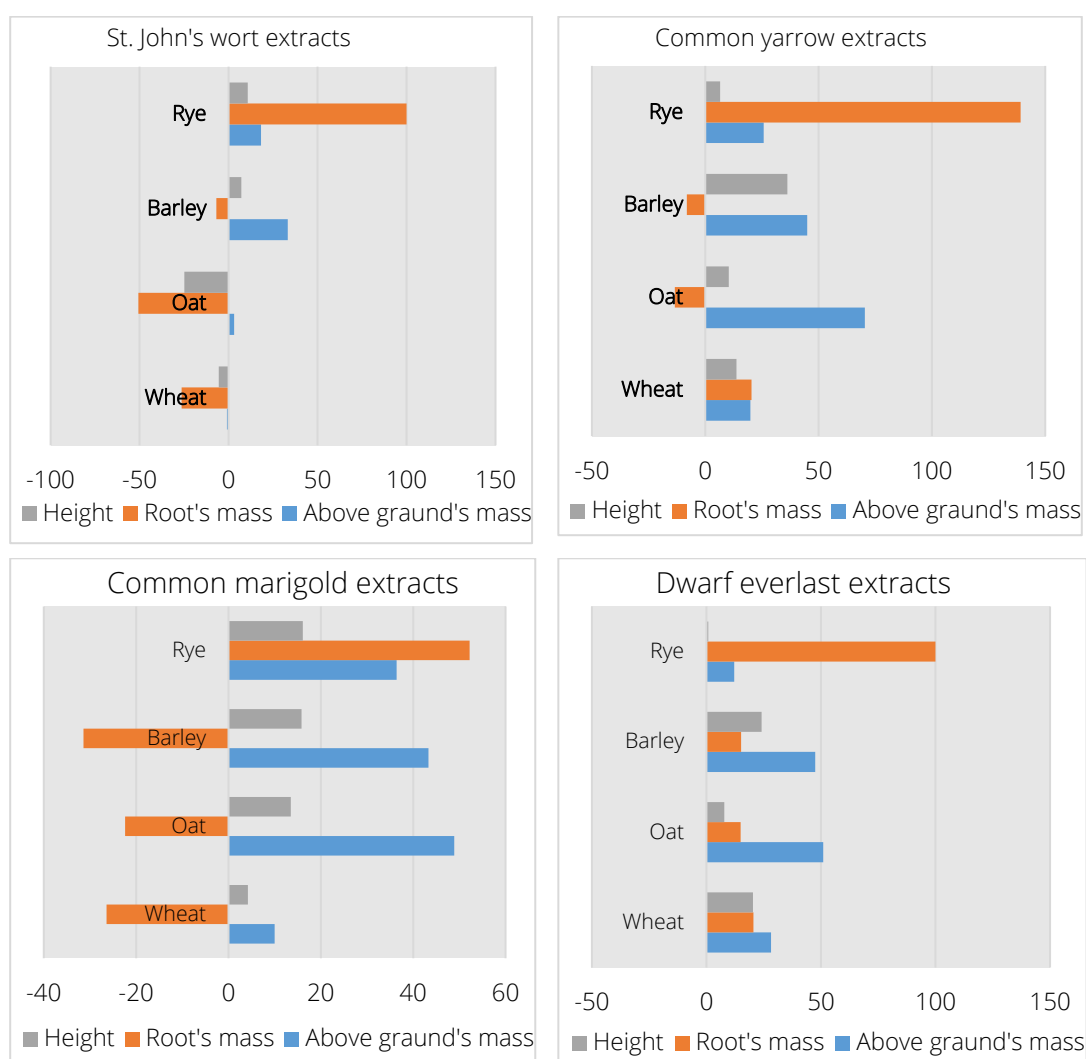


Fig.1. The effect of plant extracts on the development of cereals (+/- % to control)

Dwarf everlast extract had a positive effect on the development of all crops, but the best was on wheat (the height increased by 20.3%, the mass of the aerial part by 28.2%, the mass of the roots by 20.8%) and barley (+24.1%, +47.5%, + 15.1%, respectively). Stimulation of root growth was observed best in rye (+100%).

Thus, a clear species reaction can be traced: wheat was best affected by extracts of yarrow and dwarf everlast, oat by yarrow, barley by yarrow and dwarf everlast. All extracts had approximately the same effect on rye. Extraction with St. John's wort had a negative effect on all crops except rye.

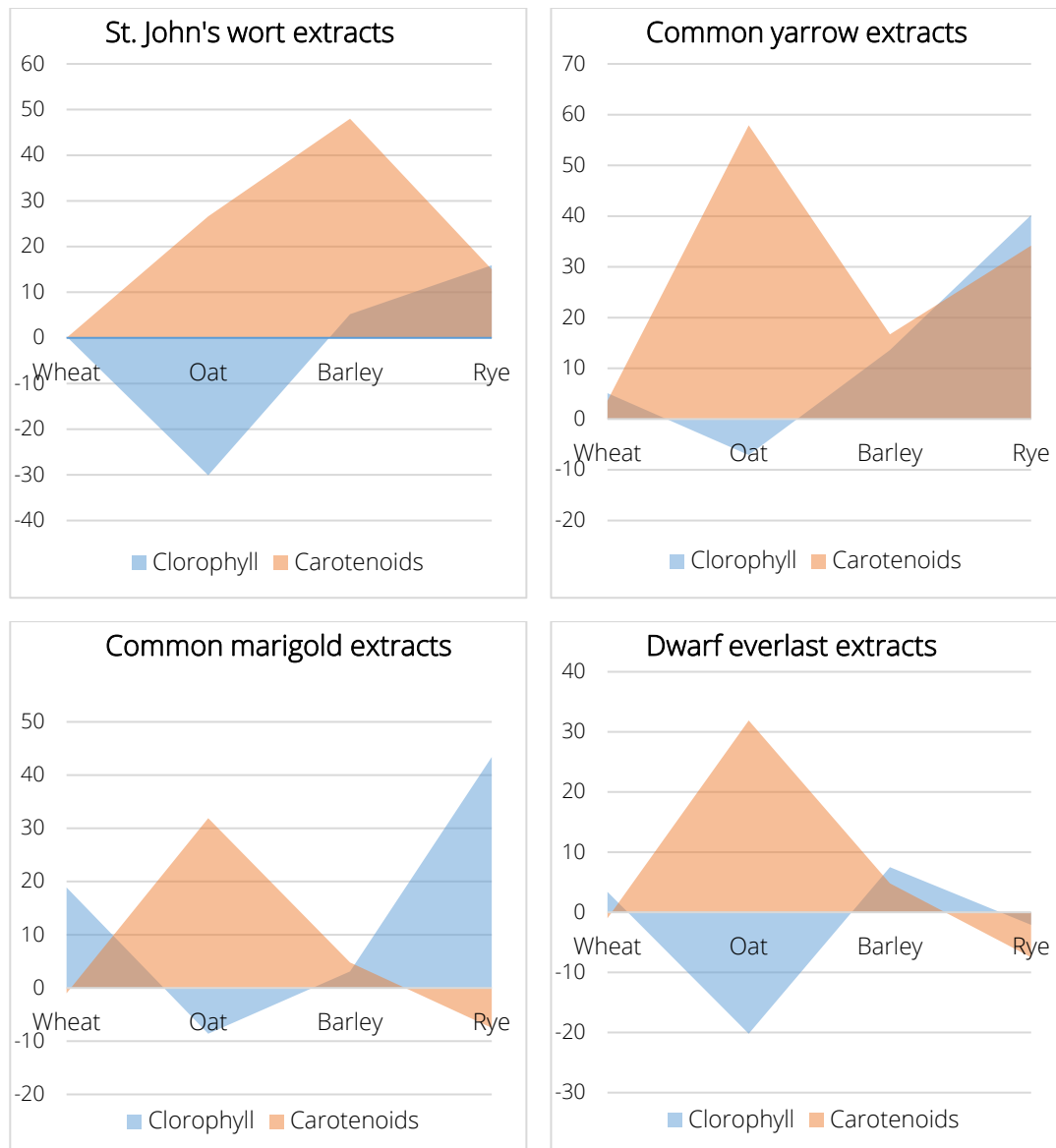


Fig. 2. The effect of plant extracts on the amount of pigments of cereal's leaves (+/- % to control)

It seems that the selectivity of the action of plant extracts is due to the content of lectins in them and the nature of their interaction with lectins and polysaccharides of root hairs. It is known that lectins affect the formation of ion channels in the cell membrane and the selectivity of the penetration of various compounds into cells [3]. Due to this mechanism, various substances can selectively enter the plant, which in

one case can stimulate, and in the other inhibit the growth and development of plants. Moreover, in the studied medicinal plants, lectins differ not only in activity, but also in specificity of action and pH-activity. It is quite possible that in general allelopathic interactions between plants are related to the nature of the activity and specificity of the lectins of these plants.

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