

## ABSTRACT

In modern agriculture plant growth regulators are mainly used for plant protection. Their effect on yield is varied, and depends on the variety, weather and soil conditions. Their effectiveness also depends on the dose, method and time of application. At the same time as conducting work on the synthesis of new substances regulating plant growth, it is necessary to conduct work on the use of natural origin substances, which could modify plant growth and improve their resistance to stress.

Despite lots of benefits, and possibilities of using legumes, the area sown with them in Poland is small. Therefore improving the biological potential of legumes is a very important aspect of plant breeding, agriculture and science. There is little data about the effect of growth regulators on legumes.

The aim of the research was to evaluate the effectiveness of relatively new substances like zearalenone and brassinosteroids, used separately or as a mix on the productivity of yellow lupine and pea.

This study was testing the influence of ZEN and EBR on firstly yield and quality of seeds of pea and yellow lupine depending on the concentration and method of application (seed soaking, spraying or watering in the flowering stage) used in different conditions of vegetation and secondly the photochemical activity of the plant at different intervals of applications and their participation in reducing symptoms of drought stress.

The effectiveness of potential regulators has been evaluated on the basis of their impact on plant height, number of pods and seeds and the amount of yield and evaluation of the chemical composition of seeds in terms of nutritional value. The influence of EBR and ZEN was also tested on photochemical activity of photosynthesis and usefulness in increasing resistance to negative environmental factors. Experiments were carried out in the gardening tunnel, under controlled conditions in greenhouses or in the field.

During the research a multiple number of analytical techniques was used. The following were measured: content of fat (modified method of Bligh-Dyer), tocopherols, tocotrienols and carotenoids (liquid chromatography), proteins (spectrophotometric method - Bradford), sugars (anthrone method), ascorbic acid (spectrophotometric method), proline (spectrophotometric method - Ting Rouseff) and zearalenone (liquid chromatography). For physical measurements a set for the measurement of electric potential in the tissues was used (mikro conductivity meter), an instrument for measuring the greening leaves (SPAD) and a chlorophyll fluorescence analyzer (PEA).

Zearalenone and 24-epibrasinolid in the cultivation of pea and yellow lupine increase plant yield by increasing the number of pods, the number and the weight of seeds per plant. Bigger mass accumulation in the seeds could be associated with a small stimulation of photochemical activity PSII by both substances. The effectiveness of both used substances was dependent on the application method and the species and varieties of plants. The pea variety Wiato and the lupine variety Talar were more sensitive to the

ZEN and in case of EBR the pea variety Roch and the lupine variety Mister. Among the methods of applications used, spraying plants is a method which could be used in practice.

ZEN and EBR modify the chemical composition of the seeds improving their nutritional value by increasing the content of proteins, lipids, sugars, vitamins and their precursors. But it is not possible to indicate a method of application that could repeatedly change the chemical composition of the seeds. It seems that the impact of EBR and ZEN is dependent on the weather and growing conditions.

ZEN and EBR took part in mitigating the effects of drought stress. Evidence of this are the positive changes of some physiological and biochemical parameters, and above all a clear increase in yield of seeds.

There are no contraindications to the use of zearalenone in agricultural practice, because the concentration of ZEN in the newly produced seed was comparable to concentrations in the seeds from control groups.