

INVESTIGATION OF PHYSIOLOGICAL CHANGES IN ROOTS AND SHOOTS AS A RESULT OF A HERBICIDE TREATMENT (II) DEVELOPMENT OF THE PIGMENT CONTENT OF SHOOTS

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Introduction

It is demonstrated both by our experiments so far and the literary data that, after the roots are removed, a considerable change in the pigment content takes place in the isolated leaves, parallel with the starting protein hydrolysis (CHIBNALL—WILTSHIRE, 1954; UDVARDY—HORVÁTH; HORVÁTH—LASZTITY, 1967). In our experiments for studying the physiological role of roots we have investigated the effect of 2,4-dichlorine-phenoxy-acetic acid sodium salt being the Dikonirt. We have obtained the result that the Dikonirt treatment has a damaging effect not only on the two species of dicotyledons investigated by us but on the monocotyledons, as well. A common effect can be noticed on the inhibition of root development and on the perturbation of the balance of metabolism (LONTAI—HORVÁTH, 1969). At present we are investigating the change in pigment content as a physiological index reacting sensitively to the absence of roots, resp. to the damage of root function.

Material and Method

Our experimental plant was the MFB barley species, grown in an artificial plant growing apparatus (LASZTITY—HORVÁTH, 1965). The Dikonirt treatment was applied at the leaves of the seven days old plants (Postemergent treatment).

The following variations were investigated:

- (1) untreated control,
- (2) 0,125 g Dikonirt/0,12 sq. m,
- (3) 2,000 g Dikonirt/0,12 sq. m.

The Dikonirt was sprayed to the plants after being dissolved in tap-water. The experiment was carried out in five repetitions. The change of the pigment content was noticed according to the method described by HORVÁTH—LASZTITY (1965), LASZTITY—HORVÁTH (1965), on the first and fourth days.

Discussion

Fig. 1 shows the development of the total pigment content on the first and fourth days after spraying.

In the total pigment content in the leaves of control plants we can observe the continuous increase until the plants get 11 days old, while in the leaves sprayed, on the day after the treatment, a considerable decrease is caused by a higher Dikonirt concentration, and a milder one in case of a lower concentration. The decrease in pigment content caused by the spraying is obvious four days after the treatment as compared with the control. At the control, the increase of the total pigment

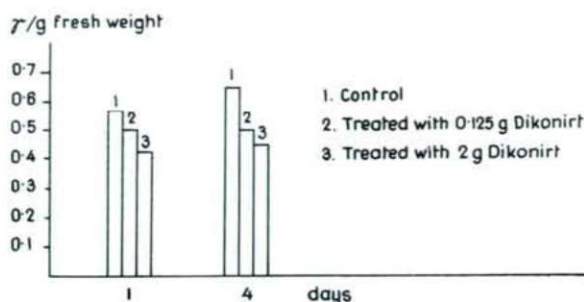


Fig. 1. Development of the total pigment content after spraying

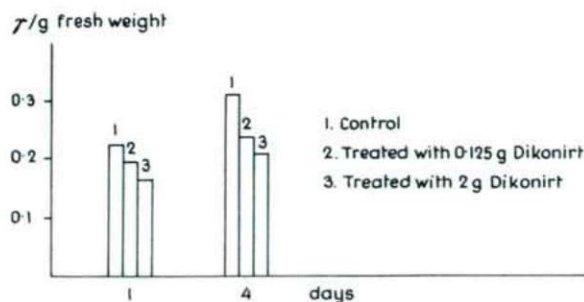


Fig. 2. Change of the quantity of chlorophyll-*a* and *b* after spraying

content is in a linear relation to the increase by division of the barley leaf that lasts till the 12th day. An increase of negligible value can be noticed also at the plants treated but, depending on the concentration, a destruction is caused in the quantity of pigments by Dikonirt.

In Fig. 2, the development of chlorophyll-*a* and *b* is demonstrated as a result of Dikonirt spraying, and in Fig. 3, the quantitative change of carotene.

In Fig. 2 we can observe that the amount of chlorophyll-*a* and *b* in the control plant is growing till the 11th day.

The quantity of green components has decreased as depending on the concentration of Dikonirt spray, both on the first and fourth days after spraying. Only the quantitative increase connected with the plant growth can be seen at the 11 days

old plants. The destructive effect of Dikonirt spray (post-emergent treatment) is of equal degree both on the first and fourth days after spraying.

In the carotene content of control plants, we couldn't observe any change at 8 and 11 days old plants, as shown by Fig. 3. The quantity of carotene has considerably decreased after being sprayed with Dikonirt of high concentration, but in case of a lower concentration it has decreased in a lower degree. The Dikonirt concentration we used caused a substantial the carotene quantity four days after spraying.

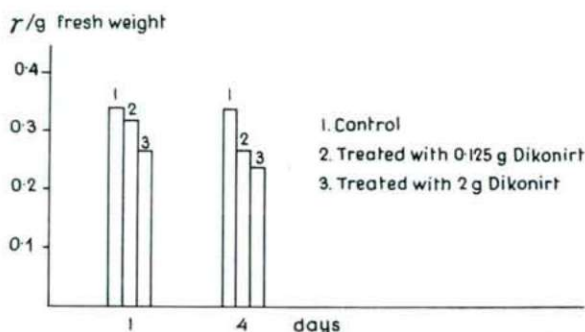


Fig. 3. Change of the quantity of carotene after spraying

The results obtained agree with the literary data at the post-emergent apply of Dikonirt. The damage is increasing if the concentration is higher like in case of the experiments of LIDER et al. (1966) carried out with simazine and diuron.

At the barley plant, the two sorts of Dikonirt concentration caused some destruction in the development of roots too in agreement with the statements of BINGHAM (1967). This may be connected with the alterations in the pigment content. Consequently, we could observe the change in the amount of pigments at the two sorts of Dikonirt concentration applied by us. According to the literary data, the pigment synthesis is inhibited by herbicides (HERRETT—BERTHOLD, 1965).

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