Acta Biologica Szeged 16 (3—4), pp. 93—95 (1970)

EFFECT OF POST-EMERGENT HERBICIDE TREATMENT ON MONO- AND DICOTYLEDONS

I. Lontai, Mária Horváth and I. Rojik

Institute for Plant Physiology, Lóránd Eötvös University Budapest; Genetic Group Attila József University, Szeged

(Received December 5, 1969)

In our previous experiments, we applied preemergently (simultaneously with sowing) Diconirt, the sodium salt of 2,4-dichlorphenoxiacetic acid for mono- and dicotyledons (Lontai, Horváth, 1970; Horváth, Lontai, 1970). Monocotyledons are less sensitive to Diconirt than dicotyledons. Applied post-emergently (after shooting) in very high concentration (p. p. m. 666), it proved delatarious to growing and development of the seedlings of *Vicia faba* and *Pisum sativum*. The effect could be observed at cell-division, as well (Rojik, Horváth, Lontai, 1969). In this publication we are investigating its effect, applying it post-emergently and in different concentrations, on mono- and dicotyledons of the same age. From the point of view of selectivity, the form of the application of Diconirt is important because it does not penetrate into the tissues of plants in the same way.

Materials and Methods

We have chosen simple hybrid corn MV 530, sunflower „Iregi csikos (stripys Ireg)", and fodder-peas „IP_2" for experimental plants. The seeds were sown in culturevessels of 0,25 sq. m surface, into washed river sand, watered with Knopp's solution. The vessels were placed into an artificial plant-grower (Horváth, Lasztity, 1965). All the three plant species were sprayed on one occasion, seven days old, with a running tap water solution of various concentrations of Diconirt, the sodium salt of 2,4-dichlorphenoxiacetic acid. The next treatments, according to plant species, were: spraying with Diconirt of 0,25, 0,50, 1, 2, 4 per cent, and control. The plants treated and controls were watered with running tap water.

The experiments were repeated three times. On yellow corn we carried out a special experiment, as well, treating three-day old seedlings in the so-called nail-state in the described variations. The formation of fresh and dry weights, the amount of nitrogen and phosphorus were investigated 2, 4, 5, 10 days after treatment. Nitrogen was determined according to Nessler, phosphorus content according to Fiske—Subbarow (1925).

Discussion of experimental results

We have observed that the simple hybrid corn MV 530, as three-day old seedling in nail-state, tolerated spraying with Diconirt in a concentration applied by us. In the indices examined no difference was found.

The results of a series are presented in Table 1 after spraying seven-day old seedlings.

It appears from the table that, as compared with the control, the value of fresh and dry weights decreases after increasing the Diconirt concentration.

Table 1

Effect of Diconirt treatment on the formation of the fresh and dry weights of seven-day old simple hybrid corn MV 530, and on the formation of the total nitrogen and phosphorus content. (Calculation on γ/mg dry material) (Analysis four days after treatment)

	Control	Diconirt concentration in percentage				
		0.25	0,50	1	2	4
Fresh weight	4,392	2,750	3,100	2,620	3,020	1,660
Dry weight	0,410	0,300	0,308	0,265	0,293	0,239
Nitrogen	159	182	192	180	183	188
Phosphorus	41	34	30	48	36	31

Furthermore the water intake may gradually decrease after increasing the concentration, and in the same way growing and development also decrease.

As to the nitrogen and phosphorus content of the plants that suffered destruction in their growing, they did not show any difference, even four days after treatment, when compared to the control.

Diconirt in increasing concentration may have inhibited root activity and in this way also growing of shoots when seven days old.

The increase of N and P for 1 mg dry material is illusory for the gain in weight has decreased.

In Table 2 the result of a series of the sunflower „Iregi csikos" and of fodder-peas „IP_2" is shown.

Table 2

Effect of Diconirt treatment on the formation of the fresh and dry weights of sunflower „Iregi csikos" and seven day old fodder-peas „IP_2", and on the formation of the total nitrogen and phosphorus content. (Calculation γ/mg dry material) (Analysis ten days after treatment)

		Control	Diconirt concentration in percentage				
			0,25	0,50	1	2	4
Sunflower „Iregi csikos"	Fresh weight	7,410	5,780	5,620	4,910	5,185	2,450
	Dry weight	0,580	0,430	0,400	0,321	0,340	0,310
	Nitrogen	180	212	210	206	208	264
	Phosphorus	33	29	28	30	29	33
Fodder-peas „IP_2"	Fresh weight	4,150	3.180	3,720	3,300	2 010	2 630
	Dry weight	0,605	0,450	0,510	0,400	0,380	0,338
	Nitrogen	220	220	167	130	232	368
	Phosphorus	42	47	38	48	49	45

Both seven-day old plants were sprayed with the same concentration series as the yellow corn. The investigation took place ten days after the treatment. Here we have also observed a decrease in fresh and dry weights as a result of the treatment, when compared to the control.

In respect of nitrogen and phosphorus level, there was no difference to be found in the plants which suffered destruction.

On the basis of our data, peas responded to the Diconirt concentration more sensitively than the sunflower. The tissue structure has also some role at the post-emergent treatment of plants.

Summary

The sodium salt of 2,4-dichlorphenoxiacetic acid, in a concentration applied by us, had a greater influence on peas than on sunflower. Apart from the physiological differences, also the tissue structure of plants plays a role in the post-emergent treatments.

References

Fiske, O. H.; Subbarow, Y. (1925): Colorimetric determination of phosphorus. — Journ. Biol. Chem. *66*, 375—379. (In: Hoppe—Seyler—Thierfelder, 1935): Handbuch der physiologisch- und pathologischchemischen Analyse *3*, 465.

Horváth, M.; Lasztity, D. (1965): The quantitative changes of pigments in intact and detached barley leaves. — Bot. Közl. *52*, 79—82.

Horváth Mária and Lontai, I. (1970): Herbicid-kezelés hatására bekövetkező élettani változások vizsgálata a gyökérben és a hajtásban. II: A hajtás pigmenttartalmának alakulása. (Investigation of the physiological changes in roots and shoots as a result of herbicidetreatment. Formation of pigment content of the shoot (In print).

Lontai, I. and Horváth, M. (1970): Herbicid-kezelés hatására bekövetkező élettani változások vizsgálata a gyökérben és a hajtásban I. (Investigation concerning the physiological changes in roots and shoots as a result of herbicidetreatment. I). (In print).

Rojik, I.; Horváth Mária; Lontai, I. (1969): 2,4-diklórfenoxiecetsav nátriumsójának hatása Vicia faba és Pisum sativum csíranövények sejtosztódására. (Effect of the sodium salt of 2,4-dichlorphenoxiacetic acid on the celldivision of the seedlings of Vicia faba and Pisum sativum). — Bot. Közl. *56*, **245—250.**

Address of the authors:
Dr. I. Lontai
Institute for Plant Physiology, L. E. University, Budapest
Dr. Mária Horváth
Dr. I. Rojik
Genetical Laboratory of the Animal Physiology Department, A. J. University,
Szeged, Hungary