

**EFFECT OF IRRIGATION WATER POLLUTED WITH
DIFFERENT CHEMICALS ON CULTIVATED PLANTS**
II. EFFECT OF MOTOR-OIL AND SODIUM-SALT OF 2,4-D

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Abstract

In our experiments monocotyledons and dicotyledons were treated preemergently with motor-oil and sodium-salt of dichloro-phenoxyacetic acid among laboratory circumstances. Present paper is the continuation of earlier papers (HORVÁTH and TAN VAN LE 1967, HORVÁTH and KERESZTES 1977, HORVÁTH and BALOGH 1979) performed with herbicide containing Dikonirt containing 2,4-D; pursuing the same hormonal agent's study influenced by a specially effective external factor, the motor-oil.

Introduction

Irrigation is spreading in our big horticultural and agricultural farms. Mechanical weed-killing has gone into liquidation in large-scale farming almost totally — mostly because of the lack of labour-force — and the same tendency is characteristic for horticulture. During cultivation water-consumption is changing, in summer and spring this branch of agriculture requires water in greater quantity as well.

In summer irrigation period motor-oil contamination of 10 mg/l often was measured on the lower reach of river Tisza during the recent years. The river's system of canalisation irrigates cultures of pea, vegetables, sugar-beet, onion, flax rice and maize where weed-killing is performed with herbicides. Motor-oil floating on the water surface changes its healthy oxygensupply and supports anaerob processes. This effect can be increased by the herbicides' washing out of the soil, which can cause the occurrence of a modern problem, as a small quantity of hormon-type herbicides may have an enormous effect.

Materials and Methods

In preliminary experiments more species were included, of which were chosen MFB barley hybrid, asparagus pumpkin without trailer and delicate clustered cucumber of Kecskemét with the most characteristic changes. Seeds were germinated in thermostat at 23°C in dark. When controlling, humidity of filter-paper was provided by tap-water, that of treated samples with 2,4-D sodiumsalt in 1, 2, 4 mg/l concentration + motor oil 2 ml/l. Systems of evaluation coincide with those of the previous paper. Experiments were repeated 3—5 times.

Results and discussion

Treatment didn't block the germination of barley seedling, their development could be interrupted by the joint effect of motor-oil concentration of 10 ml/l and agent 2,4-D of 2 mg/l. In this case the growth of root was blocked almost completely, the length of shoot decreased by half.

The germination of asparagus pumpkin was completely blocked by the above-mentioned treatment. Decreasing the agents' quantity by half, t.e. treating with motor-oil of 5 ml/l and 2,4-D of 1 mg/l the asparagus pumpkin germinated too. The length of shoot was 1.6 mm that of the root was 0.8 mm in the case of seven-day-old plant. By this time the shoot and root length of control seedlings has exceeded 4 m.m

Cucumber was the most sensitively reactive plant to the effect of motor-oil and herbicide. Development of delicate clustered cucumber of Kecskemét was interrupted completely by preemergent dosing of 2 ml/l oil and 1 mg/l 2,4-D; soon after the seeds' germination seedlings died. Parameters of test-plants diverging sensibility are shown in Table 1.

Table 1. *Effect of motor-oil and sodium-salt 2,4-D on seedlings treated preemergently*

Test-plants	Treatment	Length of		Peroxidase activity EU/g fresh weight
		shoot	root	
Barley 6-day-old	10 ml/l oil + 2 mg/l 2,4-D	57.3	4.7	58.9
	control	115.5	135.7	55.6
Asparagus pumpkin 7-day-old	5 ml/l oil + 1 mg/l 2,4-D	1.6	0.8	43.2
	control	4.1	4.4	22.4
Cucumber 3-day-old	2 ml/l oil + 1 mg/l 2,4-D	6.3	14.2	33.00
	control	33.7	59.2	28.2

The second part of our experiments aimed the detailed plant-physiological examination of the cucumber seedlings. We measured the ascorbic-acid content and total fenol quantity of the control and treated plants.

As a result of treatment a sudden rise of total fenol quantity was expected, but deviation couldn't have been measured by the change of fenol quantity at the pre-emergently treated three-day-old cucumber, though the soluble protein content increased significantly.

Table 2. *Examination of preemergently-treated cucumber seedlings*

Treatment	PO activity EU/g fresh weight	AA γ /g fresh weight	Total fenol content γ /g fresh weight	Total soluble protein mg/g fresh weight
2 ml/l oil + 2 mg/l 2,4-D	32.6	158.00	181.00	206.00
control	28.2	150.00	180.00	150.00

Barley, asparagus pumpkin and cucumber test-plants were treated preemergently in our experiments with 2,4-D sodium-salt and motor-oil. Treatment has been established to influence the process of germination diversely in the case of monocotyledons and dicotyledons.

Oil effected the necessary for germination water-absorption processes, while herbicides 2,4-D effecting as hormones — cause changes in the plant-physiological processes of germination. The increased ascorbic-acid quantity and the increasing peroxidase activity mark the increasing oxidative dissimilation (decomposing metabolism). This was most strikingly expressed in the case of asparagus pumpkin. In the case of cucumber the change of total phenol-content is not suitable for the early signaling of damage.

In the badly-damaged plants the quantity of ascorbic-acid has suddenly increased. In the case of three-day-old cucumber seedling this effect couldn't be noticed at this early stage of development but the change was detectable in the case of seven-day-old asparagus pumpkin seedlings (SZÉLL 1980). Morphological and structural changes of the Gramineae families' germinating seeds are very similar. The embryo's fresh weight increases by 120% 20—30 minutes after the water-assimilation. (MARCUS 1966). This explains the oil's radical damaging effect on the first stage of germination.

The different 2,4-D sensibility of dicotyledons is connected with the role of cotyledon and with the late appearance of foliage-leaf, while that of monocotyledons is connected with the effect on the mobilisation of seed's reserves.

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Különböző anyagokkal terhelt öntözővíz hatása termesztett növényekre

II. Motorolja és 2,4-D nátrium sójának hatása

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Kivonat

Kísérleteinkben preemergens kezelésben a 2,4-D nátriumsóját és a motorolajat együttesen alkalmaztuk árpa, spárgatók és uborka tesztnövények felhasználásával. Megállapítottuk, hogy a kezelés a csírázás folyamatát eltérő módon befolyásolta az egyszikű és kétszikű növényeknél.

Az olaj a csírázás folyamatához nélkülözhetetlen vízfelvételi folyamatokon keresztül fejti ki hatását, míg a 2,4-D alapú herbicid, mint hormonhatású anyag a csírázás növényélettani folyamataiban okoz változásokat.

A megnövekedett aszkorbinsav mennyiség és a fokozódó peroxidáz aktivitás az oxidatív leboontó anyagcsere térfolyását jelzi. Ez a spárgatóknél volt a legkifejezettebb. Uborkánál a károsodás korai jelzésére az összfenol tartalom változása nem alkalmas. Az erősen károsodó növé-

nyekben az aszkorbinsav mennyisége hirtelen gyarapodást mutat. A három napos csíranövénynél, így az uborkánál még ez a hatás a korai időszakban nem jelentkezett, de a 7 napos spárgatók csíranövényeknél már megállapítható volt a változás (SZÉLL 1980).

A Gramoneae családban a csirázó magvak morfológiai és szerkezetbeli változásai igen hasonlóak. Az embrió friss súlya 120%-kal nő a vízfelvételt követő 20—30 perc elteltével (MARCUS 1966). Így érthető, hogy az olaj károsító hatása már a csirázás első lépésébe nagyon radikálisan avatkozhat be.

Uticaj navodnjavanja na gajene kulture različitim materijama opterećenom vodom

II. Uticaj motornog ulja i 2,4-D natrijumovih soli

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Abstrakt

U našim eksperimentima sa preemergentnom primenom zajedno smo tretirali 2,4-D natrijumovu so i motorno ulje na ječam, bundevu i krastavac. Utvrđeno je da ovo tretiranje različito utiče na proces klijanja monokotila i dikotila.

Ulje svoje dejstvo ispoljava preko prijema vode, neophodnog procesa za klijanje, dok herbicid na bazi 2,4-D, usled svog hormonalnog dejstva izaziva promene u fiziologiji klijanja.

Povećana količina askorbinske kiseline i tendencija povećavanja peroksidazne aktivnosti ukazuje na razlagajuće oksidativne procese u razmeni materija. Ovo je najizrazitije kod bundeve. Za rano utvrđivanje oštećenja u slučaju krastavca promena ukupne količine fenola nije pogodna. U biljaka sa jakim oštećenjima količina askorbinske kiseline pokazuje naglo povećavanje. U trodnevnik klijanaca bundeve već su se ukazale promene (SZÉLL 1980).

Morfološke i strukturalne promene u naklijalim semenkama Gramineae su veoma slične. Sveža težina embriona se u roku od 20—30 minuta povećava za 120% nakon uzimanja vode (MARCUS 1966). Sasvim je očigledno da se štetno dejstvo ulja radikalno pojavljuje već u prvim trenucima klijanja.

ВЛИЯНИЕ ПОЛИВНЫХ ВОД, НАГРУЖЕННЫХ РАЗЛИЧНЫМИ ВЕЩЕСТВАМИ, НА ВЫРАЩИВАЕМЫЕ РАСТЕНИЯ I. ВЛИЯНИЕ ХЛОР-БРОМУРОНА И ИХ СМЕСИ КАК СРЕДСТВА ДЛЯ УНИЧТОЖЕНИЯ СОРНЯКОВ ЭЛАКОВЫХ КУЛЬТУР

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Резюме

Нами исследовано влияние 3-(13-хлор-4 бромфенил)-I-метокси-I-метилуреа: сокращенно хлор-бромурон, на хлебные культуры. При постемергентных исследованиях, определилось фототоксическое влияние гербицида уреа на различные хлебные культуры. Результаты опытов проведенных свободно на полях в опытных горшках, обратили внимание на различную чувствительность проростающих семян к химикатам.

Те же результаты получили также Вессел (WASEL) и Вандер Веен (VAN DER WEEM) (1956) когда указали на то, что листья при использовании химического соединения уреа гораздо быстрее теряют углекислый газ. Внутри фотосистемы разложение веществ может защитить флавиноноуклеотид. На основании высшесказанных взаимодействий внутри растений можно провести опыт для установления меры детоксикации (Швеллсер, SWEELSER 1963). В этом направлении мы Прешили продолжать эксперименты, а также свободнопочвенные эксперименты зная время распада гербицидов с точки зрения сельского хозяйства и окружающей среды,