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ИНОСТРАННОГО ЯЗЫКА **№1253**

ALLELOPATHY BETWEEN WEEDS AND CROP PLANTES

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One of the primary goals of any agricultural business is getting high and stable yields despite constantly changing climatic conditions.

It's important to point out that the actual process of growing crops is affected by several factors that work together, strengthening , weakening or completely changing the effect of each other. Apart from environmental variables such as sunshine, soil, warmth and moisture there is another factor that can influence the growth and development of different plants –the process that is called allelopathy.

The term was first used in 1937 by the Austrian professor Hans Molisch in his book "The Effect of Plants on Each Other". The word deriving from the Greek compounds " allele" – and – "pathy" (meaning mutual harm) was used to describe biochemical interactions that inhibit the growth of plants by other plants that grow nearby . Although in some cases a positive effect of the plant interaction is registered too.

Recently in the mass media and on some Internet sites there appeared a lot of information related to allelopathy as a means of giving rise to crop productivity. There is not much research into this phenomenon, though. Aapart from already mentioned work of Molisch there's also Gerhard Grummer's "The Mutual Interaction of Higher Plants" and in both works the authors study the examples of plant interaction that can be mutually beneficial.

The problem is also touched upon by Prof.Mirkin in his article "Do plants communicate?" where he points out that actually the quantity of substances that a plant produces while growing outside the lab is not considerable and only indicates the presence of this specimen in the plant community.

As we can see from the available information this subject is rather controversial and little research has been done into it. That is why we became interested in the phenomenon and decided to carry out some experiments in order to study some aspects of allelopathy.

THE OBJECTIVES OF OUR WORK ARE:

- to test if there is the possible allelopathic interaction between certain agricultural plants;
- to test if there is possible allelopathic influence of weeds on agricultural plants.

THE HYPOTHESES:

1. The agricultural plants Secale Cereale.(L) (sowing rye) and Avena Sativa.(L) sowing oats don't have strong allelopathic characteristics.
2. The weeds such as Elymus r.(L) couch grass and Aegopodium padagraria (L.) have a detrimental effect on seed germination and the development of agricultural plants.

METHODS:

To prove the 1st hypothesis we chose some cultural cereals. According to some data people have been domesticating them for 8-10 thousand years. We presume that during this time the allelopathics properties of these plants have weakened a lot.

The rye and oat seeds were planted separately, although in the closeness allowing contact.

We counted the germinated seeds and later we measured the length of the sprouts and roots in each group of the plants. The experiment was repeated three times. The results are presented on charts 1, 2.

The study of the results doesn't allow as to conclude that there is a certain mutual influence between the two groups of the plants. It's more likely that a small difference in the quantity of germinated seeds, the length of sprouts and roots are caused by the major abiotic factors.

Each experiment lasted from 5 to 7 days and was repeated after 8 – 10 days, thus, it was impossible to crate perfectly equal conditions for each set of experiments. We can draw the conclusion that the first thesis of our research is true: the domesticated plants do not have a marked allelopathic interaction.

To test out the second hypothesis we chose common agricultural plants such as … We chose the breeds of the tomato and the dill according to the label information that the breeds are resistant to pests and diseases, they can be grown outside the greenhouse and tend to be fast-riping. To carry out our experiment we needed the the roots of the goutweed and the couch grass (pictures 4,5), which we had dried and then soaked in distilled water taken in the proportion 2,5 grams to 100 ml of the water.

We grew the studied group of seeds in these solutions (pics 6, 7 ,8) whereas the control group was grown in pure distilled water.(pics 9, 10, 11). The amount of liquid in Petri dishes in the studied and the control groups was the same.

As a result we found out that there was a lag in growth of the oats, dill and tomatoes compared to the control groups. This is shown in chart 3 and pictures 12, 13, 14.

We think that the concentration of the substances in the roots infusion was not so high that it could be transferred to the growth of the plants in the outdoor conditions, thus we tried to set the experiment taking in the account the criticism toward the works of Molisch and Grummer.

Analyzing the results we can assume that allelopathic influence of roots of the couch grass and the gout weed on the development of the dill, tomatoes and the oats is negative.

The result of the work can and should be used in the development of contemporary agricultural techniques on big farms and on private vegetable gardens. The couch weed as a common field wild plant often penetrates into farming fields and rows of the gardens and inhibits growth of domesticated plants.

The goat weed is a common forest plant, but it is extremely sensitive to the lighting conditions. It often grows into vegetable gardens and farming fields.
Considering this, we recommend to thoroughly cultivate beds, rows and vegetable gardens in order to get rid of not only green shoots but also the roots of the weeds. It's important also that we should look after not only the beds and rows but the soil between them.

Фото 1, 2, 3

Фото 4, 5

Фото 6,7,8

Фото 9,10,11

Фото 12,13,14

Таблица 1

Опыт 1							
Контроль				Опыт			
Рожь		Овес		Рожь		Овес	
Корень	Побег	Корень2	Побег2	Корень4	Побег5	Корень3	Побег3
28	21	57	22	16	13	41	21
24	28	48	22	22	22	43	20
11	17	51	32	13	19	29	17
20	26	43	15	18	20	35	15
17	33	25	0	17	15	32	15
33	22	39	29	13	11	37	14
0	5	39	18	0	0	22	14
34	29	38	16	25	21	23	13
23	32	45	22	15	17	33	13
18	27	48	18	20	19	35	12
0	0	38	17	0	0	21	12
29	35	63	23	32	27	34	11
14	37	22	6	27	25	28	10
16	28	28	12	20	22	24	10
44	29	33	17	26	28	25	9
22	32	17	10	23	24	19	9
19	33	31	14	19	18	28	9
0	15	32	13	16	10	19	9
39	32	35	17	28	19	17	8
0	11	46	21	31	17	17	8
26	28	30	11	18	15	21	8
12	28	9	9	19	14	20	8
10	22	23	13	32	29	20	7
27	30	38	36	17	16	21	7
11	33	48	21	19	16	24	7
20	30	41	15	39	27	17	6
31	35	37	16	21	18	14	6
14	13	23	16	21	18	13	6
24	35	17	12	24	18	19	6
0	11	47	9	8	5	16	6
27	38	39	16	28	27	16	5
15	24	37	21	19	14	18	5
0	0	58	39	0	0	0	0

0	0	43	16	0	0	0	0
0	0	29	13	0	0	0	0
0	0	46	13	0	0	0	0
0	0	28	11	0	0	0	0
0	0	24	11	0	0	0	0
0	0	24	8	0	0	0	0
0	0	3	5	0	0	0	0
0	0	16	5	0	0	0	0
0	0	29	0	0	0	0	0
0	0	11	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
12,2	**16,4**	**29,6**	**13,2**	**12,9**	**11,3**	**15,6**	**6,5**

Таблица 2

Опыт 2											
Контроль				Опыт				Опыт			
Рожь		Овес		Рожь		Овес		Рожь		Овес	
Корень	**Побег**	**Корень2**	**Побег3**	**Корень4**	**Побег5**	**Корень6**	**Побег7**	**Корень8**	**Побег9**	**Корень10**	**Побег11**
110	70	114	62	50	60	60	55	70	70	70	75
104	57	113	69	70	70	65	75	45	70	85	65
70	50	113	69	50	50	0	60	85	60	50	45
100	65	111	77	60	60	90	110	90	90	65	35
90	59	111	38	50	35	70	100	90	90	90	80
0	0	110	78	0	0	0	0	0	0	80	0
101	73	107	58	90	50	25	50	65	80	110	70
97	61	107	62	60	70	40	60	60	80	110	80
72	60	105	57	50	80	20	50	80	90	50	80
86	55	104	56	90	75	40	80	60	65	80	20
80	61	103	65	70	70	50	50	100	50	80	40
73	42	102	54	50	45	30	50	70	75	30	65
9	0	102	64	40	0	0	60	50	45	60	105
81	54	101	62	80	35	35	75	95	80	20	65
92	45	100	73	70	85	90	110	80	85	80	60
27	15	100	50	70	80	60	40	60	75	120	30
81	65	97	40	70	70	45	50	70	70	80	95
72	59	97	65	60	50	60	80	80	70	70	80
51	28	97	45	30	35	50	75	80	80	50	50
83	45	96	53	50	55	0	100	70	30	70	70
76	47	94	43	50	80	30	70	60	75	50	70
86	63	89	42	60	80	35	50	75	60	100	85
14	5	87	47	40	0	0	0	20	55	70	50

63	38	86	46	120	60	45	50	60	90	105	35
85	52	85	42	10	60	50	10	30	75	90	95
0	0	85	36	0	0	0	0	0	0	30	0
90	45	83	39	100	50	60	40	70	80	50	80
0	0	83	48	70	0	0	0	70	0	10	30
99	60	82	48	40	60	60	85	50	90	50	50
78	59	81	52	50	70	55	60	110	75	50	65
83	45	80	40	50	70	30	20	80	100	60	15
0	0	79	63	40	0	0	0	60	20	80	70
0	0	78	38	0	0	0	0	0	0	60	0
105	63	77	70	50	75	75	60	70	60	60	75
80	40	74	45	30	25	0	40	60	55	10	50
89	48	64	42	50	85	70	80	80	65	90	75
0	0	64	42	50	0	0	0	0	0	60	0
100	62	54	41	90	110	80	105	85	80	80	65
0	0	48	21	0	0	0	0	0	0	10	0
5	0	25	18	50	0	0	0	55	70	105	65
0	0	0	0	0	0	0	0	0	0	90	0
0	0	0	0	0	0	0	0	0	0	60	0
0	0	0	0	0	0	0	0	0	0	30	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
50,64	31,82	89,7	51,5	52,75	47,5	35,5	50	60,875	60,125	66,75	54,625

Таблица 3

	День	Укроп в дистил. воде	Укроп в растворе сныти	Укроп в растворе пырея	Томат в дистил. Воде	Томат в настое сныти	Томат в настое пырея	Овес в дистил. Воде	Овес в настое сныти	Овес в настое пырея
Опыт №1	1	0	0	0	0	0	0	11	0	0
	2	0	0	0	14	2	2	15	10	3
	3	6	0	0	25	3	16	17	10	1
Опыт №2	1	0	0	–	0	0	–	0	0	–
	2	15	0	–	2	0	–	12	4	–
	3	20	5	–	21	7	–	16	15	–
	5	24	7	–	25	16	–	17	16	–
Опыт №3	1	0	0	0	0	0	0	7	0	0
	2	0	0	0	0	0	0	12	10	7
	4	11	0	4	17	0	0	12	10	7