

Combined effect of Reynoutria × bohemica extract and K₂Cr₂O₃ on the growth of the root system of Allium cepa L.

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Introduction

Reynoutria bohemica (*Reynoutria × bohemica* (Chrtek et Chrtkova)) is a hybrid of Japanese reynutria and Sakhalin reynutria (*Reynoutria japonica* × *Reynoutria sachalinensis*), a perennial herbaceous dioecious rhizomatous plant of the buckwheat family. Like Japanese reynutria, the shoots have antioxidant, anti-inflammatory, cardioprotective and antitumor properties due to the presence of resveratrol.

Allium-test is a plant test system for assessing the impact of various natural factors based on the onion plant (*Allium cepa* L.).

The aim of this study is to evaluate the effect of Reynoutria bohemica extract on the growth and development of *Allium cepa* roots using the *Allium* test.



Fig. 1. Bohemian Reynoutria

Results

In the variant of the experiment with pre-soaking of onion bulbs, root growth was observed at first, and after cultivation on distilled water, a slowdown in growth (average root length 16 mm) was observed in comparison with the control group “distilled water” (27 mm). The effect of the combination of soaking followed by cultivation on distilled water with potassium dichromate showed a certain slowdown in growth in contrast to incubation on distilled water (15 mm). In all other experimental groups, potassium bichromate had a stimulating effect. In the "distilled water and potassium bichromate" group, the maximum root growth was recorded (44 mm). When growing onions in an aqueous solution of Reynoutria without soaking, there was almost no growth (average root length of 2 mm).

experience options	onion	average root length, mm.	average root length by variant, mm.
Distilled water	1	41	27
	2	19	
	3	21	
Distilled water + potassium bichromate	1	44	44
Reynoutria without soaking	1	1,5	2
	2	2	
	3	2	
	4	2	
	5	2,5	
	6	1,5	
	7	2	
Reynoutria without soaking + potassium bichromate	1	2,5	6,97
	2	11	
	3	7,4	
Reynoutria with soaking	1	13,5	16
	2	36	
	3	3	
	4	3	
	5	24,5	
Reynoutria with soaking + potassium bichromate	1	35	15
	2	14,5	
	3	3	
	4	9	
	5	38	
	6	3,5	
	7	2	

Fig. 7. Average length of onion roots in experimental variants

Research objective:

The aim of this study is to evaluate the effect of Bohemian Reynoutria extract on the growth and development of *Allium cepa* roots using the *Allium* test.

Research objectives:

1. Prepare an aqueous extract from Bohemian Reynoutria shoots using alcohol extraction followed by de-alcoholization.
2. Conduct a series of experiments using the *Allium* test to evaluate the effect of Reynoutria bohemica extract in various variants (with and without potassium bichromate).
3. Compare the morphological characteristics of the onion root system after exposure to Reynoutria bohemica extract and control solutions.
4. Analyze the effect of pre-soaking the bulbs in the extract on subsequent root growth.
5. Assess the possible synergistic or antagonistic effect of combining Reynoutria bohemica extract with potassium bichromate.

Materials and methods

The test aqueous solution from the shoots of Reynoutria bohemica was prepared by alcohol extraction (1 to 20) followed by de-alcoholization. The studied solutions included: Reynoutria extract (1:20 ratio of alcohol extraction followed by de-alcoholization); Reynoutria extract with potassium bichromate (0.4 mg/l); control groups: distilled water and distilled water with potassium bichromate (0.4 mg/l). For germination, we took 10 to 15 g of Stuttgarter Riesen onion bulbs and placed 3 of them in containers with 80 ml of the test solution. Each experiment had 3 repetitions. In another experiment, we soaked the onion bulbs for 24 hours and then grew them in distilled water and distilled water with potassium bichromate. Incubation was carried out for 7 days at a temperature of 22-24°C. After the experiment was completed, the morphological changes in the root system were evaluated, and the average root length was calculated.

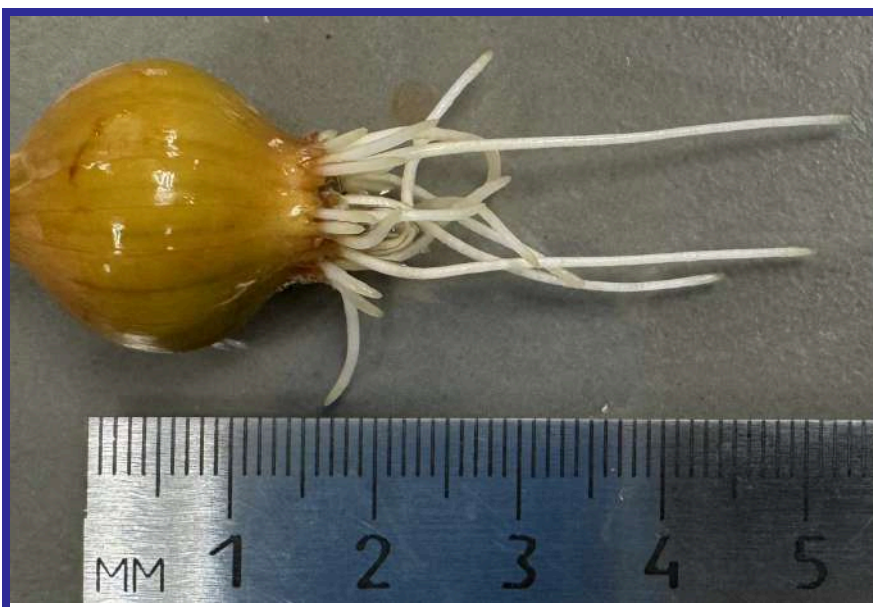


Fig. 3. Results of the growth of onion roots on Reynoutria extract with soaking



Fig. 4. Results of the growth of onion roots on Reynoutria extract with soaking and addition of bichromate



Fig. 5. Results of onion root growth in distilled water with the addition of bichromate

Fig. 6. Results of the growth of onion roots in distilled water with the addition of bichromate

Conclusions

1. Water extracts of Reynoutria bohemica inhibit the growth of the roots of the onion.
2. Incubation of bulbs with pre-soaking in the extract of Reynoutria bohemica has an initial stimulating effect on the growth of the root system of the onion.
3. The addition of potassium dichromate 0.4 mg/l in the test solution stimulates the growth of roots in all cases, except for cultivation with pre-soaking.



Fig. 2. Onions on experimental media

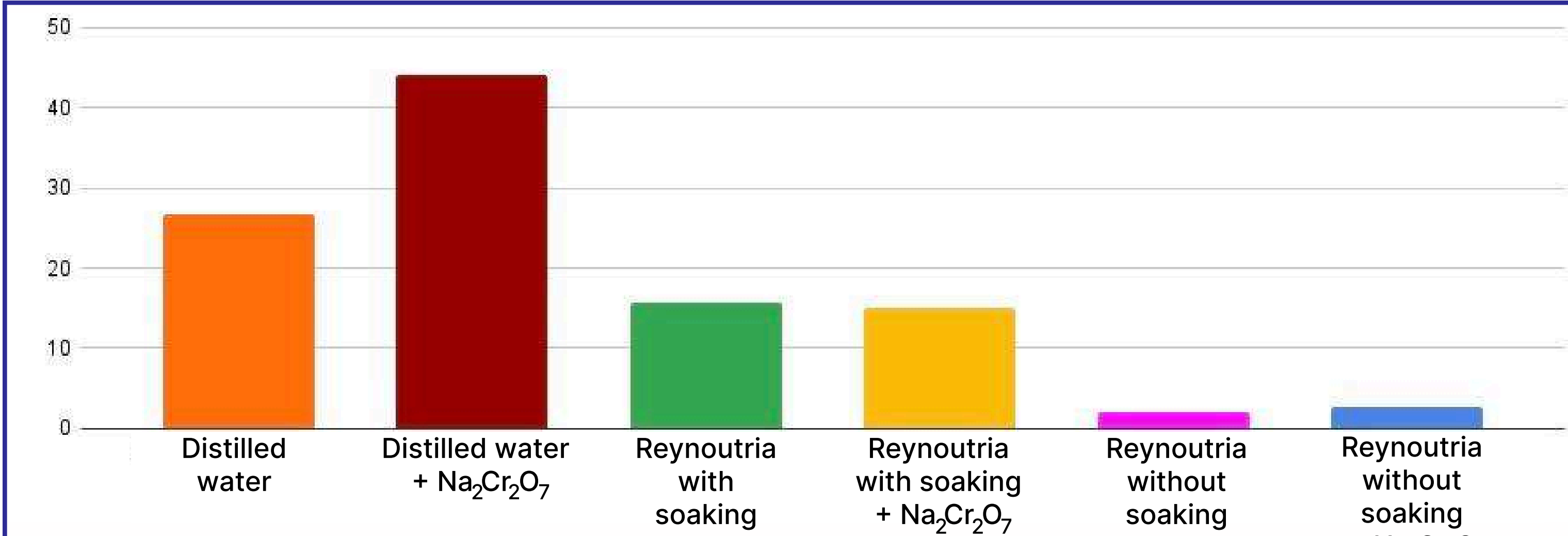


Fig. 8. Average length of the roots of an onion bulb