

The influence of 3-(1*H*-benzimidazol-2-yl)-4-phenylaminobutanoic sodium salt on spring rapeseed (*Brassica napus* L.) growth and yield

The influence of various concentrations of 3-(1*H*-benzimidazol-2-yl)-4-phenylaminobutanoic sodium salt on the growth of spring rapeseed (*Brassica napus* L.) was studied by the laboratory screening *in vitro* and in field conditions *in vivo*. The concentrations of the tested compound were from 1.5 mg/l to 10 mg/l in *in vitro*. The higher tested compound concentrations were selected from 25 mg/l to 150 mg/l for *in vivo* experiments.

Scientists are doing experiments in laboratory using *in vitro* system with the synthetic growth regulators, which promote not only plants' growth, but also increase their productivity. Research *in vitro* allow faster investigate properties known and new compounds, which are characterized as growth regulators than *in vivo* [1-6].

Experiments with 3-(1*H*-benzimidazol-2-yl)-4-phenylaminobutanoic sodium salt on rapeseed were carried out in field trials at LRCAF branch Rumokai experimental station. The size of the accounted field was 2.2 x 10.0 m. For each field 1 l of the solution was used. The spraying was accomplished before flowering. Biometric measurements were carried out of spring rapeseed after threshing.

Seeds germination *in vitro* was carried out in *Petri* dishes in the thermostat for 7 days at 25 °C with selected concentration of the tested compound solution. The study showed that the highest influence on the rapeseed germination and length of roots had 2 mg/l concentration of 3-(1*H*-benzimidazol-2-yl)-4-phenylaminobutanoic sodium salt solution. The highest effect on the height of rapeseed hypocotyls had 5 mg/l concentration of 3-(1*H*-benzimidazol-2-yl)-4-phenylaminobutanoic sodium salt solution. The highest influence on root development had 1.5 mg/l concentration of 3-(1*H*-benzimidazol-2-yl)-4-phenylaminobutanoic sodium salt solution. The tested compound of 10 mg/l concentration inhibited the growth of rapeseed *in vitro*.

Table 1. The influence of 3-(1*H*-benzimidazol-2-yl)-4-phenylaminobutanoic sodium salt on summer rapeseed yield and biochemical content

	3-(1 <i>H</i> -benzimidazol-2-yl)-4-phenylaminobutanoic sodium salt concentration, mg/l						
	0	25	50	75	100	125	150
Plant height <i>in vivo</i> , cm	130.7±1.1	130.2±3.3	134.2±5.7	135.2±1.9	134.9±0.1	126.6±7.6	131.5±1.5
Yield, t/ha	1.74±0.1	2.25±0.2	2.16±0.2	2.18±0.1	2.36±0.1	2.10±0.2	1.74±0.1
Seed mass (for 1000 seeds), g	3.94±0.2	4.12±0.1	3.97±0.2	4.07±0.1	4.06±0.1	4.19±0.1	4.02±0.1
Oil content, kg/t	239.9±1.7	249.5±2.8	260.2±3.7	249.5±5.8	254.8±4.2	315.1±15.3	293.4±7.5
Protein content, mg/100g	15.9±0.1	12.1±0.4	24.3±1.2	26.5±1.3	35.7±0.1	27.5±0.9	27.6±0.5
Ash, %	4.53±0.02	4.23±0.17	4.17±0.01	4.21±0.03	4.10±0.08	4.21±0.10	4.11±0.21

3-(1*H*-benzimidazol-2-yl)-4-phenylaminobutanoic sodium salt didn't show any significant effect on the plant height *in vivo*. When rapeseed seedlings were sprayed with 100 mg/l concentration of 3-(1*H*-benzimidazol-2-yl)-4-phenylaminobutanoic sodium salt solution, the highest average number of branches (5.7) was observed. When the same concentration of the solution was used, the maximum number of pods was detected (151.5), which was higher by 14.95% in comparison with the control sample. The seed mass (for 1000 seed samples) was determined.

When rapeseed seedlings were sprayed with 125 mg/l of the tested compound solution, the highest seed mass (4.19 g) was obtained. When oilseed rapeseed seedlings were sprayed with various concentrations of 3-(1*H*-benzimidazol-2-yl)-4-phenylaminobutanoic sodium salt, the yield of seeds varied from 1.74 to 2.36 t/ha. When rapeseed seedlings were sprayed with 100 mg/l concentration compound solution, the highest seed yield was obtained, which was 36% higher in comparison with the control sample. The highest content of oil (315 kg/t) was obtained using the 125 mg/l concentration of the study compound solution. The tested compound didn't show significant impact on the oil chemical composition. The highest content of protein (35.7 mg/100g) and lowest content of ash (4.1 %) was obtained upon using the 100 mg/l concentration of 3-(1*H*-benzimidazol-2-yl)-4-phenylaminobutanoic sodium salt solution.

Following the data of field experiments with 3-(1*H*-benzimidazol-2-yl)-4-phenylaminobutanoic sodium salt, the following results were obtained when rapeseed seedlings were sprayed:

1. with 100 mg/l of the compound, the highest number of branches, the highest protein, seed yield and lowest content of ash was obtained;
2. with 125 mg/l of the compound, the highest seed mass (for 1000 seed samples) and highest content of oil was obtained.

Literature

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