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The influnce of non-chemical weed control on the productivity of spring oilseed rape

Rita Mockevičienė, Rimantas Velička, Aušra Marcinkevičienė

Vytautas Magnus University, Institute of Agroecosystem and Soil Sciences of Agronomy Faculty of Agriculture Academy, Studentu str. 11, Akademija, Kaunas Distr., Lithuania

E-mail: rita.mockeviciene@vdu.lt

Rationale: There is a considerable amount of investigations on oilseed rape cultivated in an organic production system, but a lack of investigations in Lithuanian climate conditions, particularly with innovative weed control methods.

Methods: Treatments of the experiment: Factor A: weed control methods: 1) thermal (weed control with water steam, inter-row spacing 48 cm), 2) mechanical (weed control with an inter-row cultivator, inter-row spacing 48 cm), 3) self regulation (natural crop-weed competition, inter-row spacing 12 cm); Factor B: bio-preparations: 1) with bio-preparations, 2) without bio-preparations.


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Results: In the plots of thermal and mechanical weed control an increase was established in plant above-ground mass, mass, area, length of spring oilseed rape root, compared with the self-regulation plots. Bio-preparations increased oilseed rape above-ground mass, mass, area and length of root in the plots of thermal weed control (Figure 1).

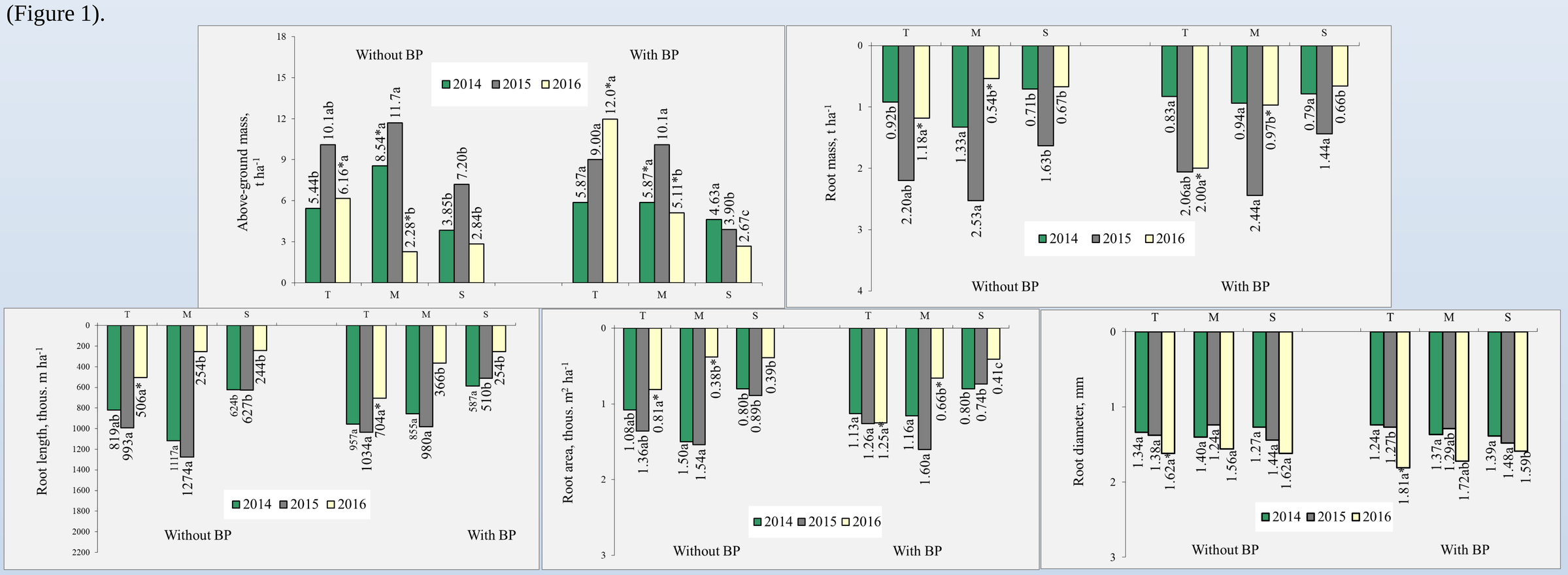

Figure 1. The above-ground mass, root mass, length, area and diameter in spring oilseed rape crop, 2014-2016.

Note. The differences between the averages of treatments of Factor A, marked by not the same letter (a, b, c) and between the averages of treatments of Factor B, marked by an asterisk are significant at 95 % probability level. T – thermal, M – mechanical, S – self-regulation, BP – biopreparation.

In the treatments of thermal and mechanical weed control in combination with bio-preparations, compared with self-regulations treatments, there was recordet higher plant height, dry matter mass, number of branches, number of siliques and number of seeds per silique. In the crop without the use of bio-preparations, the efficacy of mechanical weed control for oilseed rape biometric and yield structural indicators was higher, compared with that of thermal weed control (Table 1).

Table 1. Structure and biometric indicators in spring oilseed rape crop, 2014-2016.

Weed control methods (Factor A)	Biopreparations (Factor B)	Plant height, cm	Plant mass DM, g	Number of branches per plant	Number of siliques per plant	Number of seeds per silique
2014 m.						
Thermal	-	109.8b	6.09a	12.0b	44.6b	20.8b
	+	103.4a	5.82a	12.3a	40.6a	23.3a
Mechanical	-	112.5ab	7.28a	15.4a	49.2b	24.2a
	+	110.7a	8.59a	13.7a	48.2a	23.9a
Self-regulation	-	116.0a	9.58a	14.9ab	60.2a*	23.5ab
	+	110.2a	7.63a	13.4a	48.3a*	23.4a
2015 m.						
Thermal	-	88.9a	7.90a	5.38a	30.7a*	14.9b*
	+	90.9a	6.97a	5.26a	40.4a*	19.2a*
Mechanical	-	87.1a	7.99a	5.14a*	33.0a*	18.9a
	+	88.5a	7.96a	4.36b*	25.8b*	19.2a
Self-regulation	-	82.2a*	5.87a	3.58b*	12.9b	17.2ab
	+	67.5b*	4.10b	3.03c*	10.2c	14.6b
2016 m.						
Thermal	-	82.6a	1.39a	2.92a	18.4a*	16.9a
	+	86.5a	2.45a	3.78a	36.2a*	19.1a
Mechanical	-	83.6a	2.05a	3.16a	31.6a	17.8a
	+	84.9a	2.11a	3.11a	42.0a	18.0ab
Self-regulation	-	84.0a	1.85a	2.61a	24.7a	15.4a
	+	79.4a	2.10a	3.50a	28.3a	15.9b

Note. The differences between the averages of treatments of Factor A, marked by not the same letter (a, b, c) and between the averages of treatments of Factor B, marked by an asterisk are significant at 95 % probability level. - – without biopreparations, + – with biopreparations.

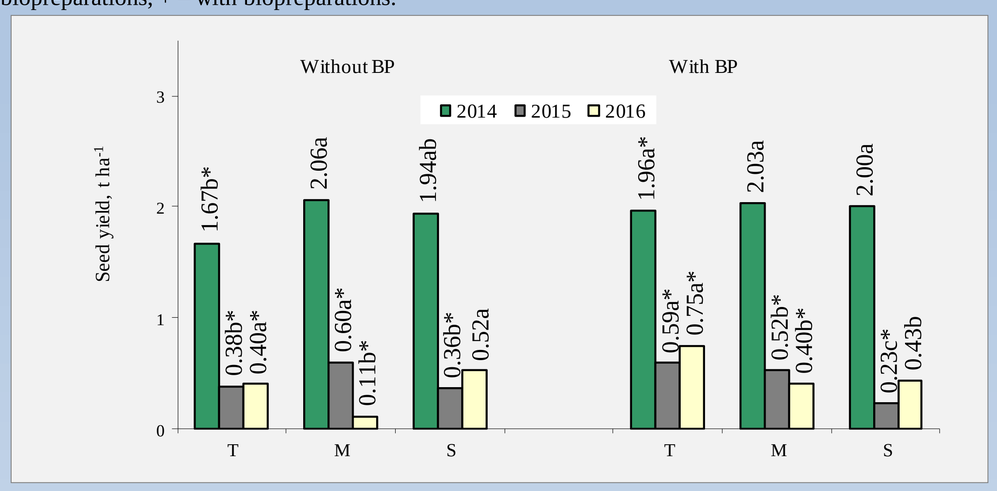

Figure 2. The seed yield of spring oilseed rape crop, 2014–2016.

Note. The differences between the averages of treatments of Factor A, marked by not the same letter (a, b, c) and between the averages of treatments of Factor B, marked by an asterisk are significant at 95% probability level. T – thermal, M – mechanical, S – self-regulation, BP – biopreparation.

The highest oilseed rape seed yield formed in the thermal weed control treatment in combination with bio-preparations (from 11,0 till 37,4 % compared with mechanical and self regulation plots).

Conclusion: The application of thermal and mechanical weed control in combination with bio-preparations in most cases increases biometric, yield structural indicators and seed yield of spring oilseed rape.