GROWTH REGULATORS IN WINTER OILSEED RAPE CULTIVATION

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I. Objective of studies

Insufficient winterhardiness of winter oilseed rape under climatic conditions of Poland is the reason why significant surface areas are ploughed after severe, snowless winters. An analysis of statistic data in this respect shows that on the average about 25% of sown plantations in Poland are ploughed because of plant destruction by frost. Winterhardiness of winter oilseed rape is determined not only by its absolute frost-resistance, but also by the autumn-formed rosette compactness and terminal bud elevation over the ground surface. Attempts to limit excessive plant growth in autumn using chemical agents were undertaken during the last years by Almond and Dawkins /1985/, who found that flurprimidol applied during the autumn growth of rape markedly decreases the terminal bud elevation, simultaneously improving its coldresistance.

An important problem in winter oilseed cultivation is also its lodging, which delays ripening and makes difficult its mechanical harvest, decreasing the quality and quantity of its yield. Losses caused by rape lodging were the subject of interest of Almond and Dawkins /1985/, Child et al. /1985/ and Stapleton /1985/, whereas Almonds and Dawkins /1985/, Child et al. /1985/, Hack et al. /1985/, Lürssen and Reiser /1985/, Rola and Franek /1987/ and Stapleton /1985/ were dealing with a possibility to counteract this phenomenon. They showed that retardans used in spring

limit the stem growth and thus prevent lodging of winter rape.

Hack et al. /1985/ and Lärssen and Reiser /1985/ obtained the best results using triapenthenol from the rosette stage till rape plants grew about 20-40 cm high. Almonds and Dawkins /1985/ found that flurprimidol prevented and limited plant lodging, as well as made easier harvesting and reduced losses of rape seeds. Child et al. /1985/ studied the influence of various dates of retardant application upon winter oilseed rape. The best results were obtained after the application of triapenthenol, whereas chlormequat displayed a weak action. Stapleton /1985/ using chlormequat and ethephon in 25 experiments obtained discrepant results and manyfold large declines of rape yields.

The purpose of the studies was to know the influence of retardants on the autumn growth and development of winter oilseed rape and on its winterhardiness, as well as their effect on the spring growth, lodging and yielding.

II. Material and method

Field experiments were carried out on the variety Beryl /"0"-type/ at the Experimantal Station Przybroda /near Poznań/ in 1986-1987 and on the variety Jantar /"00"-type/ at the Experimental Station Małyszyn /near Gorzów/ in 1986. The trials covered 7 chemicals /Table 1/, 5 of which were applied in the autumn after the formation of two leaves and 5 - in the spring at the stalk stage /Przybroda/ or at full budding of plants /Małyszyn/. Plants were sprayed with an aqueous solution of chemicals using 500-600 dm^3 water per ha. The effectiveness of the used chemicals was estimated against the control combination with no retardans.

Biometric measurements were performed before inhibition of the autumn vegetation and after the onset of the spring vegetation, as well as during the spring growth and development of plants. The overwintering index of winter oilseed rape based on the measurement of plant losses during the winter and on the estimate of plant injuries gives a synthetic picture of the size of winter damages caused to rape.

Plant lodging was estimated before a one-step harvest on the 9-point survey scale, where 9 means no lodging and 1 - a complete plant lodging. Seed yields are given at 13% moisture content.

III. Results

Biometric measurements made in the late autumn show that all the chemicals reduced falling down of leaves from plants, but simultaneously had a negative effect, except Alar 85, on the overground mass of plants /Table 2/. Among them Cutless 50 WP and Baronet 70 WP distinguished by the strongest action. Baronet 70 WP distinguished by the strongest action. Baronet 70 WP, like Flordimex TH, also had a positive influence on the number of leaves in a rosette. Much smaller plant weights under the influence Baronet 70 WP are explained by a significant reduction of leaf petioles. Cutless 50 WP had a similar action.

Baronet 70 WP and Cutless 50 WP most effectively inhibited rape growth in the autumn /Table 3/, Cutless causing a large reduction of the rape hypocotyl and increasing the root collar thickness. The remaining chemicals also inhibited plant growth in the autumn, but had no influence on the hypocotyl length, except Alar 85, also on the root collar thickness.

After a fairly sever winter of 1986/1987 it appeared that the winterhardiness of rape treated with all the chemicals, except Flordimex TH, was larger than that of the control combination /Table 3/. However, it was increased the most by Baronet 70 WP and Cutless 50 WP.

Amnog retardants applied in the spring Baronet 70 WP, Cutless 50 WP and Cultar 25 SC were the most effective in inhibiting rape growth in cultivation of both erucic acid-free variety and "Doublelow" variety /Figs. 1-2/. Due to that these chemicals increased lodging-resistance of winter oilseed rape and its seed yield /Table 4/.

On the other hand, Alar 85 and Nevirol 60 WP had a weak effect on the rape growth in the spring and on its lodging -resistance, but Alar 85, however, positively affected the

seed yield.

The presented results of a tentative valute, as they were obtained from hardly two 1-year experiments.

IV. Conclusions

- Some chemical substances constitute an interesting object for further studies on a possibility of limiting excessive winter rape growth under conditions favouring its overgrowth before winter and the improvement of winterhardiness of that plants.
- They may also be useful as substances limiting rape lodging and contributing thereby to larger yields.
- Among the chemical substances evaluated in 1986-1987 the most interesting ones appeared to be triapenthenol /Baronet 70 WP/ and flurprimidol /Cutless 50 WP/.

References

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Table 1

Description of the preparations and doses used in experiments

Preparations	Active ingredient	Producer	Doses used in kg or dm^3 per ha
Alar 85	daminozide - 50%	Uniroyal	1
Baronet 70 WP	triapenthenol - 70%	Bayer	1
Bercema CCC	chlormequat - 50%	VEB-Chemie	3
Cultar 25 SC	paclobutrazol - 25%	ICI	0.5
Cutless 50 WP	fluprimidol - 50%	Elanco	0.25
Flordimex TH	ethephon+ urea - 34.5%+1.2%	Bitterfeld	4
Nevirol 60 WP	phenylphtalaminic acid - 60%	NEVIKI	0.3

Table 2

Rosette development and overground mass of winter rape treated with retardants in autumn

Preparations	Number of leaves in rosette		Dry mass of a plant /g/
	total	falling down	
Control	7.2	2.0	2.0
Alar 85	7.2	1.4	2.2
Baronet 70 WP	7.4	1.3	1.5
Bercema CCC	7.2	1.7	1.7
Cutless 50 WP	8.2	1.2	1.7
Flordimex TH	7.9	1.7	1.8

Table 3

Heigth and thickness of wintering plants and Overwintering Index /OW-Index/ of winter rape treated with retardants in autumn

Preparations	Terminal bud elevation /mm/	Length of hipocotyl /mm/	Root collar diameter /mm/	OW-Index
Control	28.5	10.5	4.1	33.9
Alar 85	22.2	10.7	4.7	40.6
Baronet 70 WP	19.8	9.7	4.1	57.7
Bercema CCC	26.5	11.4	4.0	44.1
Cutless 50 WP	19.2	7.5	4.7	52.1
Flordimex TH	25.5	10.6	4.2	32.6

Table 4

Height and lodging of mature plants and seed yields of winter rape treated with retardants in spring

Preparations	Plant height /cm/		Lodging /9-1/x	Yield /dt/ha/
	Beryl	Jantar		
Control	140	169	2.9	37.6
Alar 85	141	154	4.0	39.8
Baronet 70 WP	119	129	7.0	40.5
Cultar 25 SC	132	130	7.1	40.5
Cutless 50 WP	125	131	6.0	41.4
Nevirol 60 WP	-	154	3.2	-

9 - no lodging 1 - total lodging

Fig.1 Growth rhythm of winter rape cv. Beryl /"0" - type/ treated with retardants in spring.

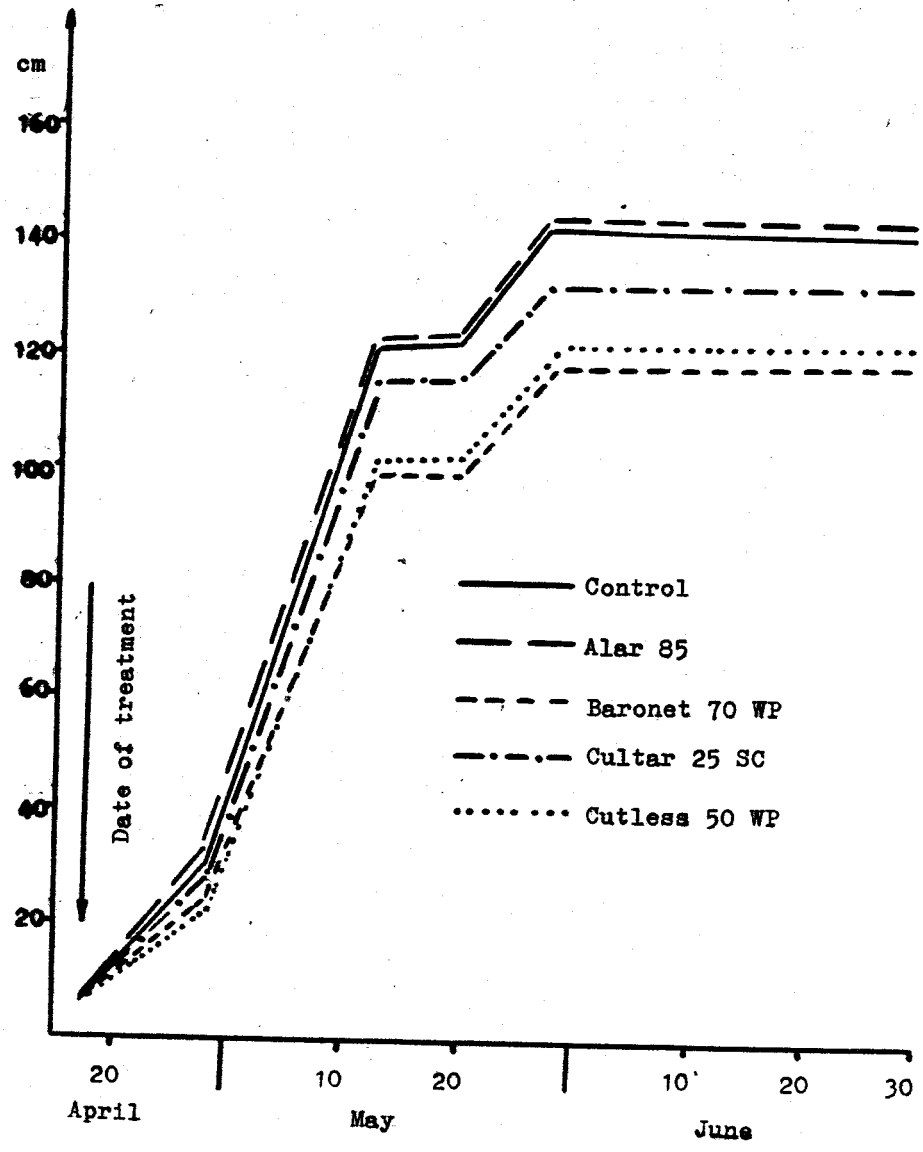

Fig.2 Growth rhythm of winter rape cv. Jantar /"00" - type/ treated with retardants in spring.