

THE INFLUENCE OF THE SPODNAM DC PREPARATION ON AGROPHYSICAL PROPERTIES OF RAPE SILIQUE AND SEED LOSSES AT MATURATION AND HARVEST

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Silique cracking and seed shedding during the final phase of rape maturation and harvest cause considerable losses making rape cultivation less profitable. Studies conducted for many years (11) proved that the problem is of great importance and its elimination or even limitation will result in millions of tons of additional amounts of valuable plant material.

Studies on silique resistance showed that seed shedding was strongly influenced by varietal features (2,3,6).

Traditional varieties with high erucic acid contents, e.g. Górczański or Garant, have much higher resistance to cracking than the new ones (12). This results in high seed losses during harvest up to 10-15 % of total yield. These losses can be limited by using a special technology of harvest (8-10) or-as proposed by Mandops firm - by using a chemical preparation called SPODNAM that influences silique resistance to cracking. A positive influence of this preparation has also been observed in Czechoslovakia (1).

The aim of the present work is answering two questions: to what degree and on what conditions does SPODNAM limit seed shedding, and what results of its application can be expected.

METHODS

The Institute of Agrophysica of the Polish Academy of Sciences in Lublin carried out studies on the determination of the influence of SPODNAM preparation on silique resistance properties that effect seed losses at harvest in the period 1987-1990. The plant material was studied both on experimental plots and on field. The preparation was applied according to Mandops instructions. Spraying was conducted in the phase of rape technological maturity (when first changes in silique colour were observed and when a silique when bent started to crack slightly). Estimations were conducted in two directions:

1. in plot experiments silique resistance properties were estimated (on the maximum number of varieties). Siliques were collected in the phase of full maturity and later. On one half of the plot SPODNAM spray was applied. The other half was a control. The methods used have been described elsewhere (4,5,7).

2. in field experiments seed losses at mechanical harvesting were studied estimating the influence of various combine-harvester parts at the same time. The studies were conducted on a control field and on a nearby field sprayed with SPODNAM. The experiments were carried out in three repetitions for each combination of the working units of the combine harvester.

In 1989 a series of comparative studies on 5 cultivated varieties was conducted in plot and field experiments in the same soil and climatic conditions. The studies included characteristics of silique resistance properties and estimation of seed shedding carried out when full maturity was reached and at belated harvest (one week after full maturity was

reached). The reaction of various varieties to SPODNAM in connection with the level of seed losses at combine harvesting was estimated.

In each of the experimental combinations rape was harvested from a plot about 150 m long, and the measuring part consisted of three sections 25 m long from which samples were picked out. Biological yield was also estimated in these sections. In each of the repetitions 20 samples were taken from the area of 100 m. Twenty metal frames (0.5 m each) were placed on the stubble field. All the seeds that had fallen to the ground during harvest were then vacuum cleaned from the field and counted. This enabled an accurate estimation of seed losses in each of the repetitions of the individual experimental combinations.

In order to estimate seed self-shedding before harvest containers were placed on the field 5 days before expected technological maturity. The containers covered the surface of 1 m (with 3 repetitions for each of the studied varieties). The number of shed seeds was counted both on the control field and on the SPODNAM sprayed field.

The methods of estimating silique resistance properties and seed losses used in the present experiment allowed for a complex characteristics of the SPODNAM preparation effects on diminishing seed losses during maturation and harvest.

RESULTS

The results obtained from the studies on silique resistance properties conducted on experimental plots showed that all the varieties studied showed a positive reaction to SPODNAM and a increase of the resistance parameters was observed in all the cases except var. Jupiter in 1987, and Jantar in 1990 (fig.1). The increase of the coefficient of silique resistance to cracking was the following:

Beryl	18 % in 1987	
Jet Neuf	10 % in 1987	and 23 % in 1989
Jupiter	0 % in 1987	and 36 % in 1989
Jantar	20 % in 1989	and 45 % in 1987
Ceres	20 % in 1989	and 33 % in 1988
Bolko	84 % in 1990	

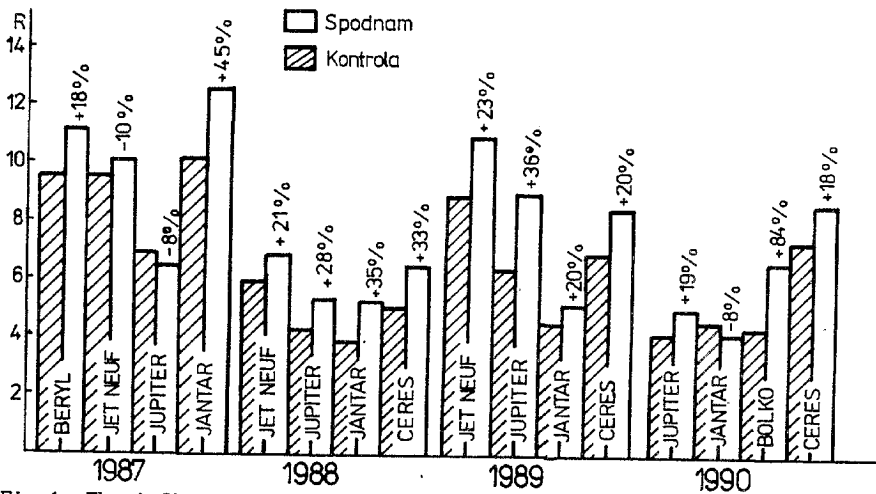


Fig.1. The influence of SPODNAM DC on increase strenght of rape siliques

The comparative studies conducted on 5 varieties in plot experiments in 1989 and on one variety in 1990 showed the increase of all the resistance parameters of SPODNAM sprayed silique with the effect of a considerably lowered amount of shed seeds on the fields on which SPODNAM was sprayed. The differences between control fields and sprayed fields in case of the individual studied varieties were in 1989 as follows:

Liporta - 14.9 kg/ha, Jet Neuf - 2.2 kg/ha, Jupiter - 3.0 kg/ha, Jantar - 13.8 kg/ha, Ceres - 36.9 kg/ha, and in 1990 98.2 kg/ha (tab.1).

The analysis of seed losses during combine harvesting carried out on the control field and on the SPODNAM sprayed field showed the positive effect of SPODNAM preparation on all the studied varieties (tab.2). In 1987 the following decrease of seed loss was observed: Jantar from 22.8 to 70.0 kg/ha, Jupiter from 15.3 to 74.3 kg/ha, and in case of Jet Neuf - 114.8 kg/ha. In 1989 the decrease of loss was as follows: Liporta - 66.8 kg/ha, Jet Neuf - 130.9 kg/ha, Jupiter - 103.2 kg/ha, Jantar - 107 kg/ha, Ceres - 124.8 kg/ha.

Tab.1 Rape seed shedding at maturation (number of seeds per m²) after SPODNAM application in field experiment (1989-1990)

Combination		Date measurement				Sum	Result (kg/ha)
Var.		I	II	III	IV		
1 9 8 9							
Liporta	A	221,7	362,0	59,3	46,7	689,7	+ 14,9
	B	108,7	221,7	35,7	26,0	392,1	
Jet Neuf	A	83,7	91,7	76,0	18,7	270,1	+ 2,2
	B	49,0	90,3	65,7	21,7	226,7	
Jupiter	A	19,7	201,0	34,0	35,7	290,4	+ 3,0
	B	27,3	138,0	26,0	38,3	229,6	
Jantar	A	51,3	225,3	374,7	38,0	689,3	+ 13,8
	B	45,0	249,7	85,0	33,3	413,0	
Ceres	A	101,3	404,3	569,7	8,3	1083,6	+ 36,9
	B	84,3	210,3	43,0	9,0	346,6	
1 9 9 0							
Ceres	A	750	132	1813	220	2915	+ 98
	B	395	47	92	340	874	

A - kontrola

B - Spodnam

I - technological maturity

II - 4 days after technological maturity

III - 11 days after technological maturity

IV - 13 days after technological maturity - harvest

Tab.2 Mean values of rape seed losses (kg/ha) during combine harvest after SPODNAM application on various rape varieties (1987,1989)

Combination Var.			Result (kg/ha)
1 9 8 7			
Jantar	A	55,7 - 1150 *	22,8 - 70,0*
	B	32,9 - 64,3*	
Jupiter	A	143,1 - 173,6 *	15,3 - 74,3*
	B	99,3 - 158,3 *	
Jet Neuf	A	404,5	114,8
	B	289,7	
1 9 8 9			
Liporta	A	377,7	+ 66,8
	B	310,9	
Jet Neuf	A	332,1	+ 130,9
	B	201,2	
Jupiter	A	240,8	+ 103,2
	B	137,6	
Jantar	A	384,3	+ 107,2
	B	277,1	
Ceres	A	378,9	+ 124,1
	B	254,8	

A - kontrola

B - Spodnam

* seed losses as influenced by combine harvester parameters

Summerizing we can conclude that SPODNAM exerts a positive influence on the number of shed seeds both during maturation and mechanical harvesting.

CONCLUSIONS

1. Application of SPODNAM causes a considerable increase of silique resistance to cracking (from 10 to 45 % and for var. Bolko even 84 %). The results show that the effects of preparation depend on the variety and cannot be generalized.

2. The studied preparation limited seed lossed both during maturation and harvest in the following way:

Liporta - 81,7 kg/ha

Jet Neuf - 133,1 kg/ha

Jupiter - 106,2 kg/ha

Jantar - 121,0 kg/ha

Ceres - 161,7 kg/ha

3. The positive influence of SPODNAM can be observed already in the rape maturation phase when it limits seed self-shedding.
4. SPODNAM application caused slightly higher silique moisture contents with negligible changes in seed moisture contents.

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