

Characteristic of yellow-seeded lines of winter oilseed rape

Aleksandra Piotrowska, Jan Krzymanski, Iwona Bartkowiak-Broda, Krystyna Krotka

Plant Breeding and Acclimatization Institute, Department of Oilseed Crops
Strzeszynska 36, 60-479 Poznan, Poland, e-mail: sspas@nico.ihar.poznan.pl

ABSTRACT

Yellow-seeded forms of winter oilseed rape were developed in the Department of Oilseed Crops by crossing a natural mutant with brighter seed coat with the spring line obtained from interspecific cross between *Brassica napus* x *Brassica rapa*. Yellow seeded lines of winter oilseed rape were improved in respect of quality features and stabilization of seed coat colour by crossing with black seeded double low lines and varieties, selection and inbreeding. The obtained yellow-seeded lines are characterized by fatty acid composition and glucosinolate content similar to the double improved black seeded rapeseed lines and varieties. Yellow seeded lines are characterized by lower fibre content, but higher oil and protein content. The average seed yield of yellow seeded lines is on the level of 80% of standard variety Lisek.

Key words: winter rapeseed – yellow seed colour – fibre

INTRODUCTION

Yellow seeded forms of oilseed rape developed in the Department of Oilseed Crops originate from the crossing of a natural mutant found in the double low rapeseed breeding material with brighter seed coat, with the spring line with segregating seed colour from the cross between *Brassica napus* x *Brassica rapa* (Ochodzki & Piotrowska 2000). To increase economic value, the yellow-seeded lines of winter oilseed rape were improved in respect of quality features and stabilization of seed coat colour by crossing with double low lines and black-seeded varieties and then through selection and inbreeding.

The work aimed to determine the traits deciding about economic value of the yellow-seeded lines and their interdependence, and the influence of the coat colour on these traits.

MATERIALS AND METHODS

The study material were 96 inbred lines of the yellow-seeded oilseed rape. These lines were evaluated in three parallel field trials in completely randomized blocks with systematically distributed standard which was the yellow-seeded line.

In the study the following characteristics were considered:

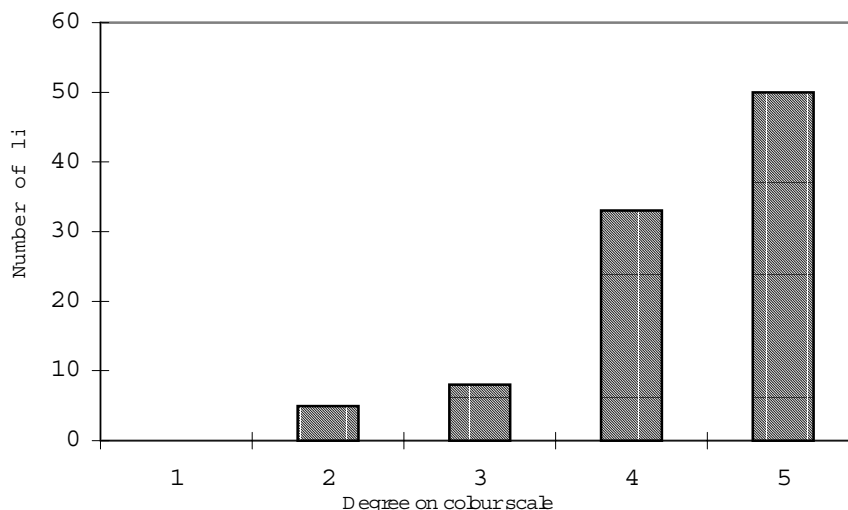
- colour of seed coat,
- yields of seeds and oil,
- 1000 seeds weight

Chemical characteristics included the content of:

- fat
- glucosinolates
- protein
- fibre (ADF, NDF).

S
brow
F
spec
and f

F
of the
yellow



flour, 2 –
method,
ie protein

velopment
arly
4.4%.

Figure 1. Distribution of seed coat colour in yellow seeded inbred lines 2001/2002 r.

The qualitative traits of the lines show considerable differentiation (Table 1).

Table 1. Characteristic of quality and quantity traits of yellow seeded lines of winter oilseed rape

Traits	Mean		Standard deviation	Min	Max	Coefficient of variability	Heritability
	Variety Lisek	Lines					
Oil content [%]	45,8	50,9	2,3	44,6	54,2	4,6	0,9
Glucosinolates [μ M/g seeds]	9,0	7,9	2,4	3,1	14,9	29,3	0,7
Fibre ADF content [%]	22,1	13,0	1,7	10,3	17,7	13,1	0,9
Fibre NDF content [%]	28,8	19,4	1,8	16,6	25,6	9,6	0,9
Protein content[%]	17,1	19,4	1,2	16,9	22,4	6,2	0,9
Seeds yield [dt/ha]	36,8	25,5	5,0	13,3	35,7	19,7	0,7
Oil yield [dt/ha]	16,8	13,1	2,9	5,9	19,3	22,5	0,8
Colour of seed coat	black	4,0	0,8	1,7	5,0	20,9	0,7
1000 seeds weight [g]	4,0	4,4	0,3	3,5	5,2	8,2	0,8

Seed yield of the studied yellow-seeded lines was, on average, 25.5 dt/ha which was 69.2% of the yield of the black-seeded standard variety Lisek in a parallel experiment. Whereas the homogenous, with respect to colour, model yellow-seeded line yielded on the level of 27.5 dt/ha which was 74.6% of the Lisek yield.

With respect to oil content the yellow-seeded lines exceed by a few per cent double low black-seeded varieties of winter oilseed rape.

The glucosinolates content is similar to the black-seeded double low varieties, but their variability coefficient shows the possibility of further lowering. Lower content of fibre (ADF, NDF) is related to yellow colour of seed coat. 1000 seeds weight is characterized by the variability appropriate for the cultivated black-seeded varieties.

Calculated correlations (Table 2) between qualitative traits and seed yield indicated clearly negative correlation between yellow colour of seed coat and ADF and NDF fibre, and positive correlation between seed yield, fat content and hence oil yield.

Table 2. Correlation coefficients of traits of yellow seeded lines

Traits	1	2	3	4	5	6	7	8
1. Seed yield [dt/ha]	1,000							
2. Oil content [%]	0,685**	1,000						
3. Oil yield [dt/ha]	0,991**	0,772**	1,000					

4.Fibre ADF content [%]	-0,523**	-0,771**	-0,593**	1,000				
5.Fibre NDF content [%]	-0,339**	-0,654**	-0,409**	0,926**	1,000			
6.Protein content[%]	-0,644**	-0,811**	-0,711**	0,542**	0,351**	1,000		
7.1000 seeds weight [g]	0,078	0,148	0,100	-0,361**	-0,386**	0,070	1,000	
8.Colour of seed coat	0,363**	0,497**	0,408**	-0,750**	-0,718**	-0,372**	0,252*	1,000

significant difference

* at the α level $\leq 0,05$;

** at the α level $\leq 0,01$

DISCUSSION

Yellow colour of seed coat in the studied lines affects lowering of seed yield, and through positive effect on higher fat content, causes increase in oil yield, similar to the yellow-seeded forms of other origin, e.g. in the lines from crossing *Brassica juncea* x *Brassica carinata* (Rakow *et al.* 1999). The study results indicate highly significant effect of yellow colour of seed coat on lowering ADF and NDF fibre content in the seeds, and on increased fat content. Similar relationships were found by Baetzel *et al.* (1999) in their work on yellow-seeded high erucic oilseed rape. High heritability coefficients show that the phenotypic value of the studied yellow-seeded lines is similar to their genotypic values.

REFERENCES

- Baetzel R., Friedt W., Voss A., Luhs W.W. (1999). Development of yellow-seeded high -erucic acid rapeseed (*Brassica napus* L.). 10th International Rapeseed Congress „New Horizons for an Old Crop”. Canberra 26-29.09.1999. Australia, CD ROM.
- Ochodzki P., Piotrowska A. (1997). Variation of chemical composition of defated rape seeds selected for low fibre content - Rosliny Oleiste - Oilseed Crops: XVIII (2), 511-524.
- Rakow G., Raney J.P., Relf-Eckstein J. 1999. Agronomic performance and seed quality of a new source of yellow-seeded *Brassica napus*. 10th International Rapeseed Congress „New Horizons for an Old Crop”. Canberra 26-29.09.1999. Australia, CD ROM.
- Rakow G., Relf-Eckstein J., Raney J.P., Gugel R. 1999. Development of high yielding, disease resistant, yellow-seeded *Brassica napus*. 10th International Rapeseed Congress „New Horizons for an Old Crop”. Canberra 26-29.09.1999. Australia, CD ROM.