THE QUALITATIVE COMPOSITION OF GLUCOSINOLATES IN THE SEEDS OF DIFFERENT WINTER RAPESEED CULTIVARS

CZ. MUŚNICKI, W. MROCZYK, A. POTKAŃSKI

University of Agriculture, ul. Wojska Polskiego 28, 60-623 Poznań, Poland

ABSTRACT

The goal of the study was to recognize qualitative changes of basic anti-nutritive substances in rapeseed (glucosinolates) in 29 "00" cultivars of various origin (from Poland, Germany, France, Holland and Denmark) as compared to the standard zero-erucic Jet Neuf. In the alkenyl glucosinolate fraction participation of 4 substances: progoitrine, napooleiferine, gluconapine and glucobrassicanapine was analysed while in the indol glucosinolate one, that of glucoiberine, sinigrine, glucoraphanine, glucoallysine, gluconasturtine, glucobrassicine and 4-Hydroxyglucobrassicine, among which the content of the latter two substances was significant (<0.1 μM/g). In the compared cultivars not only considerable quantitative and qualitative differences between these anti-nutritive substances were found, but also different indol to alkenyl glucosinolates ratios and differentiated level of goitrogenous glucosinolates.

INTRODUCTION

The aim of this work was to recognize qualitative changes of basic anti-nutritive substances in oilseed rape (glucosinolates) in the seeds of "00" cultivars of various origin as compared to the standard zero-erucic Jet Neuf.

The study involved the seeds of 29 such cultivars collected from the field test experiment PLDA. The assessed material included 11 cultivars developed by IHAR, Poland, 9 German ones (5 from DSV Lippstadt, 3 from NPZ Lembke and 1 from Semundo), 7 French ones from Cargill Semences, and 1 from Holland (Groenbroek Zaden) and from Denmark (Maribo). The trial was carried out at the University Experimental Station Przybroda near Poznań on the typical black-earth soils, on the 5th field after the last rapeseed crop. Zero-erucic Jet Neuf cultivar was sown on the same field.

The glucosinolates, enlisted in the abstract, were determined as the desulfoderivatives with HPLC according to a standard EEC procedure (EEC 1990).

RESULTS

Table 1 presents the average and minimum and maximum glucosinolate content in dry mass of the seeds harvested from plants of the studied cultivars in comparison to Jet Neuf-standard. Table 2 gives average and the highest and the lowest percentage of each of them in the alkenyl and indol fractions.

TABLE 1. Glucosinolate content (μM/g) in the seeds harvested from different type of oilseed rape cultivars

Glucosinolate	Jet Neuf	"00" Cultivars		
		average	minimum	maximum
Alkenyl	55.60	12,85	4.84	26.56
Indol	2.06	3,69	2.95	4.46
Total	57.66	16,54	9.29	30.58

In the seeds harvested from plants of the tested cultivars the glucosinolate content ranged from 9.29 and 9.94 μM/g of dry seeds from the Polish cultivars Bolko and MAH 1391 to 28.04 and 30.58 μM/g from the foreign ones Ceres and Silex (Table 1). Among the glucosinolates the alkenyl fraction was usually over 75% while the indol one no more than 25%, though the results varied considerably. In the Silex cultivar the alkenyl glucosinolates constituded almost 87% of the content while in the MAH 1391 only slightly over 50%. As compared to the zero erucic Jet Neuf, the proportion of alkenyl glucosinolates in "00" cultivars was considerably lower at higher proportion of the indol ones.

Among the determined anti-nutritive substances strongly goitrogenous progoitrine appeared in the largest amout (Table 2). The standard cultivar Jet Neuf it constituted about 60% of the total glucosinolates. The gluconapine content was lower by half and the quantities of glucobrassicanapine, 4-Hydroxyglucobrassicine and napooleiferine were slight. The Jet Neuf seeds contained little glucobrassicine. The remaining oilseed rape glucosinolates were found only in trace quantities.

In the "00"-type cultivars the proportion of progoitrine ranged from 29 to almost 59%. The lowest amount was noted in the Polish Bolko cultivar and the highest in the German one Ceres. However, the proportion of 4-Hydroxyglucobrassicine increased significantly from 3 to 13 times. The content of this indol glucosinolate rose the most in the Polish Bolko and MAH 1391 cultivars.

TABLE 2. Qualitative composition of glucosinolates (in percent) in the seeds harvested from different type of oilseed rape cultivars

Glucosinolate	Jet Neuf	"00" Cultivars		
		average	minimum	maximum
Alkenyl:				
- gluconapine	28.4	22,6	18.0	28.0
- glucobrassicanapine	5.0	4,7	1.7	6.6
- progoitryne	60.3	47,8	29.0	58.9
- napooleiferine	2.7	2.6	1.0	4.5
Indol:				
- glucobrassicine	0.1	1.1	0.5	2.9
- 4OH glucobrassicine	3.5	21,2	10.3	46.0
- other	<0.1	<0.1	<0.1	<0.1

CONCLUSIONS

1. In the "00" types cultivars the decreasing proportion of alkenyl glucosinolates was often accompanied by the increasing proportion of the indol ones.
2. Among the tested winter rapeseed cultivars the Polish ones Bolko and MAH 1391 had particularly low levels of glucosinolates in seeds.
3. Among the glucosinolates from the seeds of these cultivars the proportion of progoitrine was low while that of 4-Hydroxyglucobrassicine high.

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