

# Glucosinolate types and concentrations in seedlings of different Brassica species used for food

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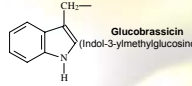
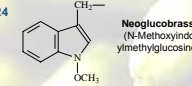
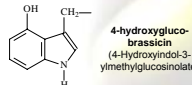
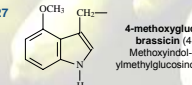
## INTRODUCTION

Brassicaceous food crops contain in their tissues different types and quantities of glucosinolates. These compounds co-occur with myrosinase isoenzymes which catalyze the hydrolysis of the  $\beta$ -D-thioglucopyranoside bond releasing a variety of biologically active products. Glucosinolates and products thereof have various physiological effects, including beneficial effects on human health, which has increased the interest on the presence of these compounds in Brassica sprouts.

## MATERIALS AND METHODS

The content of glucosinolates in seeds and the individual parts of seedlings of five *B. oleracea* used for food (white cabbage, red cabbage, broccoli cv. Jade Crosse, cauliflower and savoy cabbage) and two *B. napus* (a low and a high-glucosinolate cultivar) was followed from germination to one-month growth. Glucosinolates were isolated and their concentration determined by MECC and HPLC following standard procedures developed at our laboratory (Sørensen et al., 1999).

TABLE 1. MAIN GLUCOSINOLATES PRESENT

Aliphatic glucosinolates			
1	$\text{CH}_2=\text{CH}-\text{CH}_2-$	Prop-2-enylglucosinolate	Sinigrin
4	$\text{CH}_2=\text{CH}-\text{C}(\text{OH})-\text{CH}_2-$	(2R)-2-Hydroxybut-3-enylglucosinolate	Progoitrin
7	$\text{CH}_3-\text{S}-\text{CH}_2-\text{CH}_2-\text{CH}_2-$	3-Methylthiopropylglucosinolate	Glucobervirin
8	$\text{CH}_3-\text{S}-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2-$	4-Methylthiobutylglucosinolate	Glucorucin
10	$\text{CH}_3-\text{S}-\text{CH}_2-\text{CH}_2-\text{CH}_2-$	(R)-3-Methylsulfanylpropylglucosinolate	Glucolberin
11	$\text{CH}_3-\text{S}-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2-$	(R)-4-Methylsulfanylbutylglucosinolate	Glucoraphanin
Indol-3-yl methyl glucosinolates			
23		Glucobrassicin (Indol-3-ylmethylglucosinolate)	
24		Neoglucobrassicin (N-Methoxyindol-3-ylmethylglucosinolate)	
26		4-hydroxyglucobrassicin (4-Hydroxyindol-3-ylmethylglucosinolate)	
27		4-methoxyglucobrassicin (4-Methoxyindol-3-ylmethylglucosinolate)	

GLUCOSINOLATES IN ALL SPECIES AT DAY 7

All *B. oleracea* varieties showed a higher glucosinolate concentration than the *B. napus* cultivars. Proportion of aliphatic vs. indol-3-yl methyl was different for all the species studied (Figure 1).

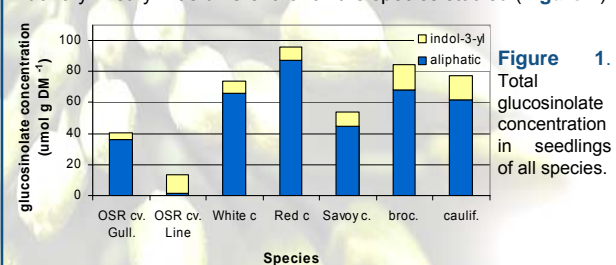


Figure 1. Total glucosinolate concentration in seedlings of all species.

GLUCOSINOLATES IN BROCCOLI DURING GROWTH

Total glucosinolate content in seedlings of broccoli decreased with time after germination. The proportion of indol-3-yl methyl glucosinolates increased with respect to the aliphatic glucosinolates (Figure 2).

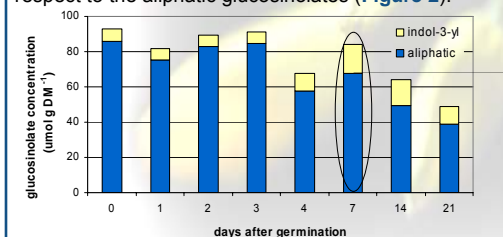


Figure 2. Glucosinolate concentration in broccoli seedlings.

GLUCOSINOLATES IN BROCCOLI AT DAY 7

Sinigrin and progoitrin were the dominant glucosinolates in broccoli at day 7 after germination. Other broccoli cultivars present higher concentration of glucoraphanin, precursor of sulphoraphane, a potent anticarcinogene. Neoglucobrassicin was the dominant indol-3-yl methyl glucosinolate (Figure 3).

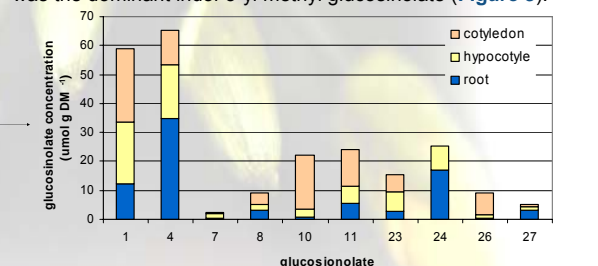


Figure 3. Glucosinolates in broccoli seedlings 7 days after germination.

## CONCLUSIONS

Upon myrosinase catalysed hydrolysis at pH above 5.5, aliphatic glucosinolates form predominantly isothiocyanates as intermediary or initial products, 2-OH aliphatic glucosinolates (progoitrin) form oxazolidine-2-thiones and indol-3-yl methyl glucosinolates form carbonium ion-derived thioethers, ascorbigens and/or oligomeric compounds following the release of the thiocyanate ion. These compounds have different physico-chemical properties including different physiological effects. The qualitative and quantitative determination of the individual glucosinolates and products thereof is thus a key factor in the study of the effects of Brassica sprouts on human health.

REFERENCES: Sørensen, H., Sørensen, S., Bjerregaard, C., and Michaelsen, S. 1999. Chromatography and capillary electrophoresis in food analysis. Royal Society of Chemistry, UK, 470 pp.