EFFECTS OF FERTILIZATION ON PHENOLIC AND GLUCOSINOLATE LEVELS IN DIPLOTAXIS TENUIFOLIA (L.) DC HYBRID VENERE

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INTRODUCTION

Diplotaxis tenuifolia (L.) DC, known as wild rocket, is a perennial herb that features the hybrid Venere, which offers enhanced resilience to lower temperatures, and improved flavor and texture. Rich in phenolics, and glucosinolates (GLSs), this variety is highly valued for its peppery, nutty leaves, making it a popular choice in gastronomy.

MATERIAL and METHODS

This study aimed to assess the impact of the biostimulant Kelpak, along with iron and potassium-enriched foliar fertilizers, on the levels of phenolics and GLSs in the leaves of Venere hybrid, compared to an untreated control group. To achieve this, twenty-three plant phenolics and four glucosinolates were quantified in 70% methanol extracts using an ultra-high-performance liquid chromatography (UHPLC) system coupled with quadrupole time-of-flight mass spectrometry (Q-ToF-MS).

RESULTS and DISSCUSION

Table 1. Quantification of phenolic compounds (mg/100g), in Venere hybrid leaves samples

Venere hybrid	Treatments			
	Control	Fe	K	Kelpak
Compound name				
Phenolic acid and derivatives				
Benzoylmalic acid[b]	32.18	24.25	12.43	26.94
Dihydroxybenzoic acid hexoside[b]	14.44	15.50	12.18	17.65
Caffeic acid hexoside[b]	10.09	4.47	6.19	10.25
Hydroxybenzoic acid hexoside[b]	3.58	4.57	1.27	1.38
p-Coumaric acid hexoside[b]	1.31	1.43	1.19	2.31
Sinapic acid hexoside[b]	-	6.79	-	4.21
Disinapoyl-dihexoside[b]	1.99	1.93	1.19	3.44
∑	**63.58**	**58.95**	**34.44**	**66.19**
Flavonols and derivatives				
Quercetin derivatives				
Quercetin 3,7,4'-tri-*O*-hexoside[c]	65.37	33.82	44.43	42.48
Quercetin-3-*O*-[2"-(6'"-sinapoyl-hexoside)-6"-hexoside]-7-*O*-hexoside[c]	-	11.96	4.99	8.15
Quercetin-3,4'-di-*O*-hexoside-3'-*O*-(6"-sinapoyl)-hexoside[c]	70.06	57.37	50.59	65.82
Quercetin-3,4'-di-*O*-hexoside-3'-*O*-(6"-feruloyl)-hexoside[c]	<LOQ	-	1.72	-
Quercetin-3-*O*-(2"-sinapoyl-hexoside)-3'-*O*-(6"-sinapoyl-hexoside)-4'-*O*-hexoside[c]	29.98	19.26	35.01	26.72
Quercetin-3-*O*-(2"-feruloyl-hexoside)-3'-*O*-(6"-sinapoyl-hexoside)-4'-*O*-hexoside[c]	4.75	0.78	3.25	3.36
Quercetin[a]	<LOQ	-	-	-
∑	**170.16**	**123.18**	**139.98**	**146.54**
Kaempferol and Isorhamnetin derivatives				
Kaempferol-3,7,4'-tri-*O*-hexoside + HCOOH[c]	-	-	-	-
Kaempferol-3,4'-di-*O*-hexoside[c]	14.41	-	10.80	9.95
Isorhamnetin-3-*O*-hexoside-4'-*O*-gentobioside[c]	3.36	1.61	2.52	3.41
Isorhamnetin-3,4'-di-*O*-hexoside[c]	28.87	-	42.73	-
∑	**46.64**	**1.61**	**56.05**	**13.36**
Other detected compounds				
1,8-Dipropoxyanthraquinone[c]	54.85	60.17	52.28	41.20
Sinapic acid derivative[b]	-	1.28	0.51	1.00
Quercetin derivative[c]	17.12	21.22	11.43	15.84
Quercetin derivative[c]	5.64	3.12	6.76	8.22
Kaempferol derivative[c]	10.21	2.03	1.45	4.01
∑	**87.82**	**87.81**	**72.42**	**70.27**
∑∑	**368.19**	**271.55**	**302.89**	**296.35**

The results revealed that quercetin derivatives were the dominant phenolics. Notably, quercetin-3,4'-di-*O*-hexoside-3'-*O*-(6"-sinapoyl)-hexoside ranged from 505.9 to 700.6 mg/kg FW across treatments, and quercetin 3,7,4'-tri-*O*-hexoside ranged from 424.8 to 653.7 mg/kg FW, with both compounds being more abundant in the control group compared to the treated samples. This trend was mirrored in the total phenolic content, which was higher in the control (3681.9 mg/kg FW) compared to the treated leaves. Conversely, the fertilized plants exhibited increased relative content of the dominant GLSs, glucosativin, which reached its highest concentration in potassium-treated plants (89.5%). Other GLSs, such as glucoerucin, neoglucobrassicin, and DMB-GLS, also showed variations, with untreated samples generally having higher relative content. The exception was neoglucobrassicin, which exhibited a slight increase in leaves treated with Kelpak. Ultimately, fertilization practices were effective in modifying the phytochemical content and enhancing specific compound levels of wild rocket leaves.

Table 2. Relative content of glucosinolates (GLSs) (%) in rocket leaves samples

Venere hybrid	Treatments			
	Control	Fe	K	Kelpak
(GLSs)				
Glucosativin	68.9	88.7	89.5	78.9
Glucoerucin	26.1	7.9	6.4	15.8
Neoglucobrassicin	2.2	1.4	2.1	3.5
DMB-GLS	2.8	2.0	2.0	1.8

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