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PHYTOCHEMICAL INVESTIGATION ON *FERULAGO CONFUSA*

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SUMMARY

The constituents of ***Ferulago confusa*** have been isolated and identified in this study.

ÖZET

Bu çalışmada ***Ferulago confusa'***nın taşıdığı etken maddeler ayrılıp tayin edilmiştir.

Key words: ***Ferulago confusa,*** flavonoids.

INTRODUCTION

Ferulago species are not studied as extensively as ***Ferula*** species. We, however, have found coumarins, flavonoids and aromatic compounds in ***Ferulago aucheri***[1] Boiss., ***F. asparagifolia***[2] Boiss. and ***F. humilis***[3] Boiss. (Umbelliferae) in our previous studies.

This present study is concerned about the fourth of these species, ***F. confusa*** Velen. By this way we hope to enrich the phytochemical data on ***Ferulago*** species.

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In the present study with ***Ferulago confusa*** Velen., we have obtained β-sitosterol, marmesin senecioate, quinol monoacetate, 1-acetylhydroquinone 4-galactoside, isorhamnetin 3-O-galactoside, quercetin 3-O-glycoside and rutin.

The structures were established by comparing their spectroscopic data to those of literature values (1, 3, 4) and by TLC comparisons with authentic samples.

MATERIAL AND METHOD

Plant Material:

Ferulago confusa Velen. (Umbelliferae) was collected from İstanbul in July 1989 and identified by E. Tuzlacı, a voucher specimen is deposited in the Herbarium of the Faculty of Pharmacy, University of Marmara (MARE 2200).

Isolation of Compounds:

Powdered aerial parts of ***F. confusa*** (180 g) were extracted with $CHCl_3$ and EtOH in a Soxhlet. The extract was evaporated in vacuo yielding 7 g of a residue. The residue was fractionated in a silicagel column (4x80 cm) eluting with petroleum ether, a gradient of C_6H_6 was added up to 100 % followed by $CHCl_3$ and EtOH both to 100%. Purification of the compounds was carried out by sephadex LH-20 columns eluting with MeOH and by preparative TLC plates. The compounds were obtained in the following order: β-sitosterol (20 mg), marmesin senecioate (25 mg), quinol monoacetate (22 mg), 1-acetylhydroquinone-4-galactoside (47 mg), isorhamnetin 3-O-galactoside (26 mg), quercetin 3-O-glycoside (17 mg), rutin (15 mg).

RESULTS AND DISCUSSION

From ***Ferulago aucheri, Ferulago humilis, Ferulago confusa*** two new aromatic compounds 1-acetylhydroquinone 4-galactoside and quinol monoacetate were isolated and identified for the first time.

1-acetyl hydroquinone 4-galactoside (1): Mp 125°. The IR Spectrum showed the presence of an aromatic ring (3050, 1610, 1570, 1530 cm^{-1}) and polyhydroxy groups (3590, 3500, 3400, 3250 cm^{-1}), various peaks between 1000-1100 cm^{-1} which indicated the presence of a sugar moiety, the peaks at 1730 cm^{-1} and 1240 cm^{-1} showed the presence of acetyl group as well.

The UV spectrum having the maximum at 258 nm correlated the aromatic structure.

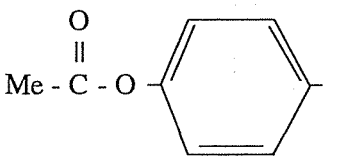
The ^1H NMR spectrum (in CD_3OD + $CDCl_3$) showed the aromatic peaks at δ 7.92 (2H, d, J= 8 Hz) and δ 6.5 (2H, d, J= 8 Hz) a peak at δ 2.5 (3H, s) indicated the acetyl methyl group, sugar protons were between 4.65-4.75 ppm as a multiplet and CH_2OH group of the sugar was at δ 3.82 (1H, dd, J= 12 Hz and 2.5 Hz).

The ^{13}C NMR spectrum showed the acetyl carbonyl at δ 174.0 and acetyl methyl peak at δ 15.5.

Quinol monoacetate [2]: The UV spectrum showed the presence of an aromatic compound (278 nm) which was correlated by its IR spectrum (3050, 1600, 1560, 1540, 1512, 1500 cm^{-1}). The peaks at 1730 and 1245 cm^{-1} showed the presence of an acetyl group and the peak at 3250 cm^{-1} showed the presence of a hydroxy group. A blue-purple colour formed with $FeCl_3$, indicating a free phenolic hydroxyl group.

The ^1H NMR spectrum ($CDCl_3$) showed the aromatic peaks at δ 7.72 (2H, d, J= 8 Hz), δ 6.43 (2H, d, J= 8 Hz), methyl signal at δ 2.37 (3H, s).

The ^{13}C NMR spectrum indicated an acetyl carbonyl at δ 174.0.



(1) R = Gal
(2) R = H

β-sitosterol: Mp 128°, IR (v max $CHCl_3$ cm^{-1}): 3400 (hydroxyl), 1630 (C=C), 1375 (gem-dimethyl), 1060-1050 (C-0).

Marmesin senecioate: Mp 138°, IR (v max KBr cm^{-1}): 1725, 1710, 1660, 1630, 1575, 1490, 1450, 1390, 1280, 1235, 1150, 1130.

^1H NMR ($CDCl_3$): 3H (6.22, d, J= 9.5 Hz); 4H (7.60, d, J= 9.5 Hz); 5H (7.20 s); 8H (6.74 s); 2'H (5.12 brt); 3'H (3.22, d, J= 9 Hz).

The structure of the flavonoids were established mainly by UV shifts and by TLC comparisons with standard samples. The UV data of the flavonoids are given in Table 1.

Table 1: UV data (λ max, nm) for flavonoids from *Ferulago confusa*

	MeOH	**NaOMe**	**$AlCl_3$**	**$AlCl_3$ / HCl**	**NaOAc**	**NaOAc / H_3BO_3**
Isorhamnetin 3-0-glycoside	256,268 (sh) 356	276, 348 412	269, 303 (sh) 405	267, 300 (sh) 358, 400	274, 316 387	257, 267 (sh) 358
Quercetin 3-0-glycoside	255, 300 (sh) 355	270, 325 405	275, 302 (sh) 330 (sh) 428	270, 295 (sh) 360, 395	270, 380	260, 378
Rutin	260, 300 (sh) 360	272, 328, 410	275, 302 (sh) 432	272, 300, 363 (sh) 402	271, 324, 393	262, 298, 387

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