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苍耳属中倍半萜内酯的研究进展

张晓琦,叶文才^(*),赵守训

(中国药科大学天然药物化学教研室,江苏 南京 210009)

摘要: 介绍了近年来苍耳属植物中倍半萜内酯化合物的研究概况,包括准确的结构式、植物来源及波谱数据。由于其具有多种活性,尤其是抗肿瘤、抗癌活性,故倍受重视。

关键词: 苍耳属;植物来源;倍半萜内酯

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Progress in studies on sesquiterpene lactones from *Xanthium* L.

ZHAN G Xiao-qi, YE Wen-tai, ZHAO Shou-xun

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作者简介: 张晓琦 (1974-)男, 1996年毕业于山东医科大学药学院药学专业, 现在中国药科大学攻读药物化学博士学位。研究方向: 天然产物活性成分研究与新药开发。 Tel (025) 5322132 E-mail xqzhang74@hotmail.com

* 通讯联系人, Tel (025) 5322132

(Department of Natural Medicinal Chemistry, China Pharmaceutical University, Nanjing Jiangsu 210009, China)

Key words *Xanthium* L.; plant resources; sesquiterpene lactone

倍半萜广泛存在于植物、微生物、海洋生物及某些昆虫中,虽然骨架仅有 15 个碳原子,但由于生物体内微妙的代谢过程而生成形形色色的基本骨架的化合物,并有复杂的立体结构,其中很多具有重要的生物功能和生理活性。倍半萜内酯是菊科植物的特征性成分,这些苦味的化合物常含有 α, β -不饱和 γ 内酯结构片段,研究表明它是其生物活性的一个主要功能团^[1,2]。倍半萜内酯化合物具有抗肿瘤和细胞毒活性,微生物生长抑制作用(抗菌),防治血吸虫病,皮肤致敏作用,昆虫拒食作用,引起脊椎动物中毒和植物生长抑制作用

(植物毒素)^[3]。苍耳属 *Xanthium* L. 植物约有 25 种,广泛分布于世界各地,我国有 3 种及 1 变种。苍耳属在世界各地民间主要用于利尿、催吐、催泻,治前列腺疾病、发烧、淋巴结核、肝炎和癌症^[4]。由于倍半萜内酯化合物活性的重要性,也为进一步研究开发苍耳属植物,特将苍耳属中的倍半萜内酯化合物做一总结。

苍耳属中主要含愈创木烷型和裂愈创木烷型内酯化合物。xanthation (23) 是活性研究比较多的一个化合物^[5-7], 化合物 (1~ 39) 结构式见图 1, 来源及波谱数据见表 1。

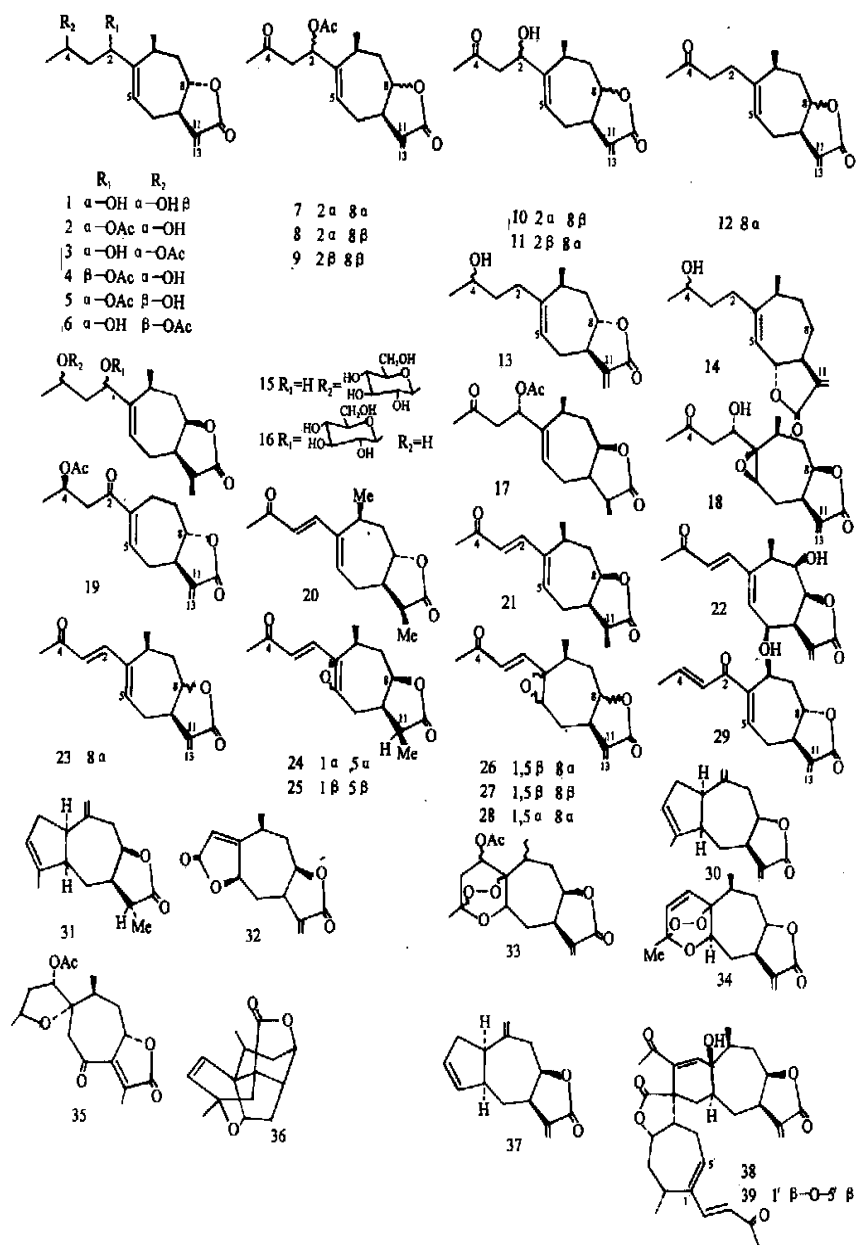


图 1 苍耳属中倍半萜内酯化合物 (1~ 39) 的结构式

表 1 苍耳属中的倍半萜内酯类化合物

序号	名 称	来源*	波谱数据	序号	名 称	来源*	波谱数据
1	deacetyl xanthanol	a	IR, MS, $^1\text{H}^{[8]}$, $^{13}\text{C}^{[9]}$	22	Φ , Φ -dihydroxy-8-epi-xanthatin	b	IR, MS, ^1H , $^{13}\text{C}^{[3]}$
2	xanthanol	a, b	^1H , $^{13}\text{C}^{[9]}$	23	xanthatin	a, b, c	$^1\text{H}^{[5]}$, $^{13}\text{C}^{[9]}$
3	isoxanthanol	a, b	^1H , $^{13}\text{C}^{[9]}$	24	$\text{I}\alpha$, 5α -epoxy- $1\text{I}\alpha$, 13-dihydro-tomentosin	h	IR, UV, ^1H , $^{13}\text{C}^{[18]}$
4	2-epixanthanol	c	MS, $^1\text{H}^{[10]}$	25	β , β -epoxy- $1\text{I}\alpha$, 13-dihydro-tomentosin	f, h	IR, MS, $^1\text{H}^{[19]}$, $^{13}\text{C}^{[18]}$
5	4-epixanthanol	b, d	^1H , $^{13}\text{C}^{[9]}$	26	β , β -epoxyxanthatin	a, b	IR, MS, $^1\text{H}^{[8]}$, $^{13}\text{C}^{[17]}$
6	4-epiisoxanthanol	b, d	^1H , $^{13}\text{C}^{[9]}$	27	8-epixanthatin- β , β -epoxide	e, g	IR, MS, $^1\text{H}^{[11]}$
7	xanthinin	a, b	^1H , $^{13}\text{C}^{[9]}$	28	1, 5α -epoxyxanthatin	a, b	IR, MS, $^1\text{H}^{[8]}$, $^{13}\text{C}^{[17]}$
8	xanthumin	e, f	$^1\text{H}^{[11]}$	29	anhydrodehydroalbin	a	IR, MS, ^1H , $^{13}\text{C}^{[9]}$
9	2-epixanthumin	e	IR, MS, $^1\text{H}^{[11]}$	30	xantholide A	i	UV, IR, MS, $^1\text{H}^{[20]}$
10	2-hydroxytomentosin	b, e, f, g	$^1\text{H}^{[12]}$	31	xantholide B	i	IR, MS, X-ray, $^1\text{H}^{[20]}$
11	β -hydroxy-xanthinosin	a	IR, MS, $^1\text{H}^{[12]}$	32	bis-norxanthanolide	g	MS, $^1\text{H}^{[14]}$
12	xanthinosin	b, c, d	$^{13}\text{C}^{[9]}$	33	2-acetoxy-1, 4-endo-peroxide-4, 5-epoxyxanthanolide	f	IR, MS, ^1H , $^{13}\text{C}^{[19]}$
13	4-hydroxy-1 (5), 11 (13)-xanthadien-1,2, 8 α -olide	d	$^{13}\text{C}^{[9]}$	34	Φ , β -epoxyxanthant-in- $\text{I}\alpha$, 4 α -endo-peroxide	b	IR, MS, ^1H , $^{13}\text{C}^{[17]}$
14	4-O-dihydroinisoniolide	d	IR, MS, ^1H , $^{13}\text{H}^{[9]}$	35	cyclospinosolide	a	IR, MS, ^1H , $^{13}\text{C}^{[9]}$
15	deacetyl xanthanol-4 β -glucoside	a	FAB, ^1H , $^{13}\text{C}^{[13]}$	36	xanthipungolide	f	IR, MS, ^1H , $^{13}\text{C}^{[19]}$
16	deacetyl xanthanol-2 β -glucoside	a	FAB, ^1H , $^{13}\text{C}^{[13]}$	37	ziniolide	h	$^1\text{H}^{[18]}$
17	11 α -H, 13-dihydroxanthumin	g	MS, $^1\text{H}^{[14]}$	38	pungiolide A	f	IR, MS, ^1H , $^{13}\text{C}^{[19]}$
18	2-hydroxytomentosin- β , β -epoxide	b	IR, MS, $^1\text{H}^{[15]}$	39	pungiolide B	f	IR, MS, ^1H , $^{13}\text{C}^{[19]}$
19	2- wide 4-O-acetyl-deacetyl xanthanol	a	IR, MS, $^1\text{H}^{[16]}$, $^{13}\text{C}^{[9]}$				
20	1 α , 13-dihydro-xanthatin	b	IR, MS, ^1H , $^{13}\text{C}^{[17]}$				
21	1 α , 13-dihydro-8-epi-xanthatin	h	IR, UV, MS, ^1H , $^{13}\text{C}^{[18]}$				

* a *Xanthium spinosum* b *X. strumarium* c *X. orientale* d *X. italicum* e *X. indicum* f *X. pungens* g *X. cavanillesii*
h *X. catharticum* i *X. canadense*

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