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Phytoconstituents of *Ticanto crista* (L.) R. Clark & Gagnon (Caesalpiniaceae): A Review

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Abstract

Ticanto crista *(L.) R. Clark & Gagnon (=* Caesalpinia crista *L.), a member of the Leguminosae family, is a medicinally important plant traditionally used in various systems of medicine, including Ayurveda, for treating a wide range of ailments. It has attracted increasing scientific interest due to its rich phytochemical profile and therapeutic potential. This review serves as a comprehensive index of the chemical structures of common and medicinal compounds isolated from* C. crista*, highlighting their diversity and relevance. The aim is to consolidate existing knowledge of these compounds, ranging from flavonoids, diterpenoids, steroids, saponins, alkaloids, and other classes of secondary metabolites, many of which exhibit promising pharmacological activities. Despite its long-standing ethno-medicinal use, the number of detailed pharmacological and phytochemical investigations into* C. crista *remains comparatively limited. While more than one hundred distinct compounds have been reported, the majority have not been extensively evaluated for their biological activities or mechanisms of action. This underlines a significant research gap and represents a valuable opportunity for researchers to explore and assess the bioactivity and therapeutic potential of these compounds. By compiling and indexing these chemical structures, this comprehensive review provides a foundational resource for future drug discovery efforts. It is intended to support researchers working in the fields of natural product chemistry, pharmacognosy, and ethnopharmacology. Additionally, it may stimulate renewed interest in C. crista as a reservoir for novel pharmacophores. The insights gained from further investigation into its compounds could lead to the development of innovative treatments for various diseases, reinforcing the importance of traditional medicinal plants in modern biomedical research.*

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Keywords: Ticanto crista, Caesalpinia crista, phytoconstituents, taxonomy, review

INTRODUCTION

Across a large portion of India and other nations, plants have historically been and continue to be a rich source of several natural products. It is widely utilized in conventional human health care systems. A significant member of the Caesalpiniaceae family includes *Caesalpinia crista* L. is a well-known traditional medicine that is abundantly grown across Southeast Asia's tropical and subtropical climates [1]. The species contains primary active ingredients that include diterpenoids, flavonoids, and peltogynoids [2]. The *Caesalpiniacrista* L. has medicinal virtues in all its parts, although the seed kernels are the component most frequently employed in different medical systems worldwide [3]. The antinociceptive, antibacterial, antimalarial, antifungal, muscle

contractile, larvicidal, hepatoprotective, anticonvulsant, anti-filarial, anti-tumor, anti-psoriatic, anti-estrogenic, anti-helminthic, adaptogenic, anti-diabetic, and anti-inflammatory properties of *C. crista* L. were discovered through pharmacological research [4]. All these activities noted due to the presence of diverse chemical compounds, which are listed further.

TAXONOMY

Ticanto crista (L.) R. Clark & Gagnon in PhytoKeys 205: 70. 2022; *Guilandina nuga* L., Sp. Pl., 2. 1: 545. 1762; *Guilandina axillaris* Lam., Encycl. 1(2): 435. 1785; *Ticanto nuga* (L.) Medik., Theodora 52. 1786; *Guilandina paniculata* Lam., Encycl. 1(2): 435. 1785; *Genista scandens* Lour., Fl. Cochinch. 2: 428. 1790; *Guilandina parvifolia* Stokes, Bot. Mat. Med. 2: 466. 1812; *Caesalpinia nuga* (L.) W.T. Aiton, Hort. Kew, ed 2, 3: 32. 1811, Baker in Hook. f. Fl. Brit. India. 2: 255. 1878; Cooke, Fl. Pres. Bombay 1: 438. 1958; *Caesalpinia paniculata* (Lam.) Roxb., Hort. Beng. 32. 1814; *Caesalpinia scandens* Heyne ex Roth, Nov. Pl. Sp. 209. 1821; *Caesalpinia axillaris* (Lam.) DC., Prodr. 2: 481. 1825; *Caesalpinia laevigata* Perr., Mém. Soc. Linn. Paris 3: 104. 1825; *Caesalpinia crista* var. *parvistipula* Urb., Symb. Antill. 2(2): 271. 1900.

- *Basionym: Caesalpinia crista* L. Sp. Pl. 1: 380. 1753, emend Dandy & Exell in J. Bot. 76: 179. 1938. ≡ *Guilandina crista* (L.) Small, FL. S.E. U.S. 591, 1331 (1903).
- *Type:* Ceylon ("Ceylan") [Sri Lanka], Herb. Hermann vol. 1, fol. 68, no. 157 (lectotype (designated by Skeels in Science, n.s., 37: 922. 1913): BM [BM000621459!]).
- *Illustration:* Wight, Ic. t. 36. 1838 (*C. paniculata*).

An armed climber reaching 15 meters. Stems with few, scattered recurved prickles, bark rough, and yellowish-grey leaves with 3–6(–8) pairs, opposite to occasionally slightly sub-opposite; stipulate; stipules are triangular, persistent; petiole 2–4 cm; rachis 5–30 cm, usually armed with recurved prickles; leaflets are 2–4 or 6 pairs per pinna, coriaceous, opposite, elliptic, and cuneate to obtuse, apex rounded to obtuse, and terminal leaflets 2–7 × 1–3.2 cm, lateral leaflets 2–5.5 × 1–3 cm, and glabrous. Inflorescence is a raceme or panicle, axillary or terminal, 10–40 cm, axes glabrous or sparsely tomentose. Flower is yellow, fragrant, bracteate, and bracteolate; bracts are persistent, triangular, or lunate, bracteoles are caducous, broadly elliptic, acute, sometimes with dentate margins; calyx lobes are glabrous, sepals five in number; petals are five in number, yellow in color with standard petal deep orange or red striped, hairy inside towards the middle. Stamens are 10 in number, filaments woolly, and anthers are orange. Ovary is glabrous or sparsely tomentose; style slender; stigma funnel shaped. Pods rhombic–elliptic in outline, indehiscent, and turned blackish when dry, *ca* 5 × 3 cm. Seeds are black, one or rarely two per pod, circular to reniform, and flat.

DISTRIBUTION

Andaman Islands, Australia, Cambodia, China (Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hong Kong, Hubei, Hunan, Sichuan, Taiwan, Yunnan), India, Indonesia, Japan (Ryukyu Islands), Malaysia, Mauritius, Micronesia, Myanmar, New Caledonia, Papua New Guinea, Philippines, Solomon Islands, Sri Lanka, Thailand, Vanuatu and Vietnam [5].

CHROMOSOME NUMBERS

2n = 24

PHYTOCHEMISTRY

Kalauni et al. isolated caesalpinin MA-MD are furanoditerpenoids of the cassane type, whereas caesalpinin ME are diterpenes of the cassane type lacking C-5 hydroxyl substituents and a furan ring. While caesalpinin MC is the first cassane type furanoditerpene with a norcaesalpinin MA and MB, dihydrofuran ring are 16-norcassane type diterpenes, and norcaesalpinin MC is the 17-norcassane type diterpene. *C. crista* L. seed kernel extract from dichloromethane the cassane-type diterpenescaesalpinin MA, caesalpinin MB, caesalpinin MC, caesalpinin MD, caesalpinin ME together with three norcassane-type diterpensnorcaesalpinin MA, norcaesalpinin MB, norcaesalpinin MC and (17)-dehydrocaesalmin

F, caesalmin B, caesaldekarin e, caesalmin C, 2-acetoxy-3-deacetoxycaesaldekarin e, caesalmin E, caesalpinin C, 2-acetoxycaesaldekarin e, caesalpinin E, 7-acetoxybonducellpin C, norcaesalpinin B, 6-acetoxy-3-deacetoxycaesaldekarin e Cassane type furanoditerpenoides are represented by caesalpinin MA, caesalpinin MB, caesalpinin MC and caesalpinin MD, whereas compound caesalpinin ME denotes a cassane type diterpene lacking C-5 hydroxyl substituents and a furan ring. Caesalpinin MC is the initial example of a cassane type furanoditerepe with a dihydrofuran ring among them, norcaesalpinin MB and MA are 16-norcassane diterpenes and norcaesalpinin MC is a 17-norcassane diterpene [6].

There are five cassane type diterpenes and two non-cassanediterpenes, reported compounds as caesalpinin C, caesalpinin D, caesalpinin E, caesalpinin F, caesalpinin G, norcaesalpinin D, norcaesalpinin E, 2- acetoxy-3-deacetoxycaesaldekarin e, norcaesalpinin A, norcaesalpinin B, norcaesalpinin C, caesaldekarin e, caesalmin B, caesalpin F, caesalmin G, 14 (17)- dehydrocaesalpin F, 2-acetoxycaesaldekarin e and 7- acetoxybonducellpin C [7].

Cheenpracha et al. extracted chemical compounds from *C. crista* L. seed and identified the compounds as taepeenin J, taepeenin K, taepeenin L, (5α,8β)- vouacapane, (5α,6β,8β)- voucapan-6-ol, (5α) – vouacapa-8(14), 9(11)-diene [8].

The chemical compounds from seed kernels of *C. crista* L. in dichloromethane extract and studied there antimalarial properties against *P. falciparum* FCR-3/A2 *in-vitro*. Isolated compounds were caesalpinin H, caesalpinin I, caesalpinin J, caesalpinin K, caesalpinin L, caesalpinin M, caesalpinin N, caesalpinin O, caesalpinin P, norcaelsalpinin F, caesalpinin C, caesalpinin D, norcaesalpinin E, caesaldekarin e, 2-acetoxyl-3-deacetoxycaesaldekarin e, 1-deacetoxy-1-oxocaesalmin C, caesalmin E, 3-deacetoxy-6-acetoxycaesaldekarin e, 2-acetoxycaesaldekarin e, bonducellpin A, bonducellpin B, bonducellpin C, and α–caesalpin [9]. Preliminary phytochemical screening showed the presence of carbohydrates, alkaloids, proteins, flavonoids, triterpenoids, diterpenes, glycosides, tannins, glycosides and saponins in roots (Table 1) [10–11]. Jadhav et al. isolated a furanoditerpenoid marker from seed kernels of *C. crista* L. as 17-methyl-voucapane-8(14), -9(11)-diene [12].

Table 1. Phytoconstituents are found in plants.

Plant Part	S.N.	Name of Compound	Molecular Formula	Reference
Seed kernels	1	17-methylvouacapane-8(14)-9(11)-diene	$C_{20}H_{26}O$	[12]
Stem and Root	2	Pulcherrimin	$C_{12}H_{22}Fe_2N_2O_4^{+2}$	[13]
	3	6-methoxypulcherrimin	$C_{19}H_{14}O_8$	
	4	8-methoxybonducellin	$C_{18}H_{16}O_5$	
	5	bonducellin	$C_{17}H_{14}O_4$	
	6	2,6-dimethoxybenzoquinone	$C_8H_8O_4$	
	7	2',4'-4'-trihydroxychalcone	$C_{15}H_{12}O_4$	
	8	2'4'-dihydroxy-4'-methoxychalcone	$C_{16}H_{14}O_4$	
Seed kernels	9	Caesalpinin MA	$C_{24}H_{34}O_6$	[9]
	10	Caesalpinin ME	$C_{24}H_{32}O_6$	
	11	Caesalpinin MF	$C_{25}H_{34}O_8$	
	12	Caesalpinin MG	$C_{27}H_{36}O_{10}$	
	13	Caesalpinin MH	$C_{24}H_{32}O_9$	
	14	Caesalpinin MI	$C_{20}H_{30}O_3$	
	15	Caesalpinin MJ	$C_{24}H_{32}O_6$	
	16	Caesalpinin ML	$C_{20}H_{32}O_2$	
	17	Caesalpinin MO	$C_{24}H_{28}O_7$	
	18	Norcaesalpinin MC	$C_{25}H_{32}O_9$	
	19	Norcaesalpinin MD	$C_{23}H_{28}O_8$	

	20	Caesalpinin C	$C_{24}H_{32}O_6$	
	21	Caesalpinin D	$C_{24}H_{30}O_8$	
	22	Caesalpinin E	$C_{25}H_{34}O_8$	
	23	Caesalpinin F	$C_{23}H_{30}O_7$	
	24	Caesalpinin H	$C_{22}H_{28}O_7$	
	25	Caesalpinin I	$C_{22}H_{26}O_7$	
	26	Caesalpinin J	$C_{25}H_{32}O_9$	
	27	Caesalpinin K	$C_{22}H_{32}O_5$	
	28	Caesalpinin M	$C_{25}H_{34}O_9$	
	29	Caesalpinin N	$C_{23}H_{32}O_6$	
	30	Caesalpinin O	$C_{22}H_{28}O_7$	
	31	Caesalpinin P	$C_{24}H_{32}O_6$	
	32	Norcaesalpinin A	$C_{23}H_{30}O_7$	
	33	Norcaesalpinin B	$C_{23}H_{30}O_7$	
	34	Norcaesalpinin C	$C_{23}H_{30}O_7$	
	35	Norcaesalpinin D	$C_{25}H_{32}O_9$	
	36	Norcaesalpinin E	$C_{21}H_{28}O_6$	
	37	Norcaesalpinin F	$C_{21}H_{26}O_7$	
	38	Caesalmin B	$C_{22}H_{28}O_6$	
	39	Caesalmin C	$C_{26}H_{34}O_8$	
	40	Caesalmin E	$C_{26}H_{36}O_9$	
	41	Caesalmin G	$C_{20}H_{26}O_5$	
	42	Caesaldekarin e	$C_{24}H_{30}O_6$	
	43	2-acetoxycaesaldekarin e	$C_{26}H_{32}O_8$	
	44	2-acetoxy-3-deacetoxycaesaldekarin e	$C_{24}H_{30}O_6$	
	45	6-acetoxy-3-deacetoxycaesaldekarin e	$C_{24}H_{30}O_6$	
	46	14(17)-dehydrocaesalmin F	$C_{26}H_{34}O_8$	
	47	Bonducellpin B	$C_{23}H_{30}O_8$	
	48	Bonducellpin C	$C_{23}H_{32}O_7$	
	49	7-acetoxybonducellpin C	$C_{25}H_{34}O_8$	
	50	1-deacetoxy-1-oxocaesalmin	$C_{24}H_{30}O_7$	
	51	ζ- caesalpin	NA	
	52	1-deacetylcaesalmin C	$C_{24}H_{32}O_7$	
Not mentioned	53	Gallic acid	$C_7H_6O_5$	[14]
	54	Gentisic acid	$C_7H_6O_4$	
	55	Chlorogenic acid	$C_{16}H_{18}O_9$	
	56	Caffeic acid	$C_9H_8O_4$	
	57	p-coumaric acid	$C_9H_8O_3$	
	58	Ferulic acid	$C_{10}H_{10}O_4$	
	59	Cinnamic acid	$C_9H_8O_2$	
	60	Ferulic acid	$C_{10}H_{10}O_4$	
	61	Cinnamic acid	$C_9H_8O_2$	
	62	Catechin	$C_{15}H_{14}O_6$	
	63	Rutin	$C_{27}H_{30}O_{16}$	
	64	Quercetin	$C_{15}H_{10}O_7$	
	65	Myricetin	$C_{15}H_{10}O_8$	
	66	Genistin	$C_{21}H_{20}O_{10}$	

	67	Kaempferol	$C_{15}H_{10}O_6$	
Seed kernels	68	Caesalpinin C	$C_{24}H_{32}O_6$	[7]
	69	Caesalpinin D	$C_{24}H_{30}O_8$	
	70	Caesalpinin E	$C_{25}H_{34}O_8$	
	71	Caesalpinin F	$C_{23}H_{30}O_7$	
	72	Caesalpinin G	$C_{24}H_{31}O_7$	
	73	Norcaesalpinin D	$C_{25}H_{33}O_9$	
	74	Norcaesalpinin E	$C_{21}H_{29}O_6$	
	75	Norcaesalpinin A	$C_{23}H_{30}O_7$	
	76	Norcaesalpinin B	$C_{23}H_{30}O_7$	
	77	Norcaesalpinin C	$C_{23}H_{30}O_7$	
	78	2-acetoxy-3-deacetoxycaesaldekarin e	$C_{24}H_{30}O_6$	
	79	Caesalmin B	$C_{22}H_{28}O_6$	
	80	Caesaldekarin e	$C_{24}H_{30}O_6$	
	81	Caesalpin F	$C_{26}H_{36}O_9$	
	82	14(17)-dehydrocaesalpin F	$C_{26}H_{34}O_8$	
	83	2-acetoxycaesaldekarin e	$C_{26}H_{32}O_8$	
	84	7-acetoxybonducellpin C	$C_{25}H_{34}O_8$	
	85	Caesalmin G	$C_{20}H_{26}O_5$	
Seed kernels	86	Caesalpinin MA	$C_{24}H_{34}O_6$	[6]
	87	Caesalpinin MB	$C_{23}H_{32}O_6$	
	88	Caesalpinin MC	$C_{24}H_{32}O_6$	
	89	Caesalpinin MD	$C_{26}H_{32}O_8$	
	90	Caesalpinin ME	$C_{24}H_{32}O_6$	
	91	Norcaesalpinin MA	$C_{23}H_{30}O_7$	
	92	Norcaesalpinin MB	$C_{25}H_{32}O_9$	
	93	Norcaesalpinin MC	$C_{25}H_{32}O_9$	
	94	14(17)-dehydrocaesalmin F	$C_{26}H_{34}O_8$	
	95	Caesaldekarin e	$C_{24}H_{30}O_6$	
	96	Caesalmin B	$C_{22}H_{28}O_6$	
	97	Caesalmin C	$C_{26}H_{34}O_8$	
	98	Caesalmin E	$C_{26}H_{36}O_9$	
	99	2-acetoxy-3-deacetoxycaesaldekarin e	$C_{24}H_{30}O_6$	
	100	2-acetoxycaesaldekarin e	$C_{26}H_{32}O_8$	
	101	Caesalpinin C	$C_{24}H_{32}O_6$	
	102	7-acetoxybonducellpin C	$C_{25}H_{34}O_8$	
	103	Caesalpinin E	$C_{25}H_{34}O_8$	
	104	Norcaesalpinin B	$C_{23}H_{30}O_7$	
	105	6-acetoxy-3-deacetoxycaesaldekarin e	$C_{24}H_{30}O_6$	
Seeds	106	Taepeenin J	$C_{40}H_{54}O_2$	[8]
	107	Taepeenin K	$C_{20}H_{32}O$	
	108	Taepeenin L	$C_{20}H_{34}O$	
	109	(5α,8β)-vouacapane	$C_{20}H_{30}O$	
	110	(5α,6β,8β)-voucapan-6-ol	$C_{20}H_{30}O_2$	
	111	(5α)-voucapa-8(14),9(11)-diene	$C_{20}H_{26}O$	
	112	Gallic acid	$C_7H_6O_5$	[15]
	113	Protocatechuic acid	$C_7H_6O_4$	

	114	Gentisic acid	$C_7H_6O_4$	
	115	Chlorogenic acid	$C_{16}H_{18}O_9$	
	116	Caffeic acid	$C_9H_8O_4$	
	117	p-coumaric acid	$C_9H_8O_3$	
	118	Ferulic acid	$C_{10}H_{10}O_4$	
Not mentioned	119	Caesalpinin H	$C_{22}H_{28}O_7$	[9]
	120	Caesalpinin I	$C_{22}H_{26}O_7$	
	121	Caesalpinin J	$C_{25}H_{32}O_9$	
	122	Caesalpinin K	$C_{22}H_{32}O_5$	
	123	Caesalpinin L	$C_{24}H_{34}O_7$	
	124	Caesalpinin M	$C_{25}H_{34}O_9$	
	125	Caesalpinin N	$C_{21}H_{31}O_6$	
	126	Caesalpinin O	$C_{22}H_{28}O_7$	
	127	Caesalpinin P	$C_{24}H_{32}O_6$	
	128	Norcaesalpinin F	$C_{21}H_{26}O_7$	
	129	Caesalpinin C	$C_{24}H_{32}O_6$	
	130	Caesalpinin D	$C_{24}H_{30}O_8$	
	131	Norcaesalpinin E	$C_{21}H_{28}O_6$	
	132	2-acetoxyl-3-deacetoxycaesaldekarin e	$C_{24}H_{30}O_6$	
	133	Caesaldekarin e	$C_{24}H_{30}O_6$	
	134	Caesalmin E	$C_{26}H_{36}O_9$	
	135	1-deacetoxy-1-oxocaesalmin	$C_{24}H_{30}O_7$	
	136	2-acetoxycaesaldekarin e	$C_{26}H_{32}O_8$	
	137	3-deacetoxy-6-acetoxycaesaldekarin e	NA	
	138	α-caesalpin	$C_{24}H_{32}O_8$	
	139	Bonducellpin A	$C_{25}H_{34}O_9$	
	140	Bonducellpin B	$C_{23}H_{30}O_8$	
	141	Bonducellpin C	$C_{23}H_{32}O_7$	
Seed	142	Caesalpinista A	$C_{21}H_{30}O_5$	[16]
	143	Caesalpinista B	$C_{23}H_{32}O_6$	
	144	Caesaljapin B	$C_{20}H_{26}O_5$	
	145	Caesaljapin C	$C_{23}H_{30}O_7$	
	146	Caesalpinilinn	$C_{21}H_{26}O_5$	
Leaves	147	Cristasesterterpenoic acid	$C_{25}H_{42}O_3$	[17]
	148	Cristasesterterpinolgluciside	$C_{31}H_{55}O_6$	
Seeds	149	2-hydroxytrideca-3’6’-dienyl pentanoate	$C_{18}H_{32}O_3$	[18]
	150	Octacosa-12,15-diene	$C_{28}H_{54}$	
	151	3-O-methylellagic acid, 3’O-α-rhamnopyranoside	$C_{21}H_{18}O_{12}$	
	152	β-sitosterol	$C_{29}H_{50}O$	
	153	Sucrose	$C_{12}H_{22}O_{11}$	
Seed kernels	154	Caesalpinin MM	$C_{26}H_{34}O_9$	[19]
	155	Caesalpinin MN	$C_{26}H_{34}O_9$	
	156	Caesalpinin MO	$C_{24}H_{28}O_7$	
	157	Caesalpinin MP	$C_{22}H_{28}O_4$	
	158	1-deacetoxy-1-oxocaesalmin C	$C_{24}H_{30}O_7$	
	159	1-deacetylcaesalmin C	$C_{24}H_{32}O_7$	
	160	Caesalmin C	$C_{26}H_{34}O_8$	
	161	Bonducellpin C	$C_{23}H32O_7$	

	162	Caesaldekarin e	$C_{24}H_{30}O_6$	
	163	2-acetoxycaesaldekarin e	$C_{26}H_{32}O_8$	
	164	2-acetoxy-3-deacetoxycaesaldekarin e	$C_{24}H_{30}O_6$	
	165	Norcaesalpinin E	$C_{21}H_{28}O_6$	
Seed kernels	166	Caesalpinin MF	$C_{25}H_{34}O_8$	[2]
	167	Caesalpinin MG	$C_{27}H_{36}O_{10}$	
	168	Caesalpinin MH	$C_{24}H_{32}O_9$	
	169	Caesalpinin MI	$C_{20}H_{30}O_3$	
	170	Caesalpinin MJ	$C_{24}H_{32}O_6$	
	171	Caesalpinin MK	$C_{24}H_{32}O_6$	
	172	Caesalpinin ML	$C_{20}H_{32}O_2$	
	173	Norcaesalpinin MD	$C_{23}H_{29}O_8$	
	174	7-acetoxybonducellpin C	$C_{24}H_{34}O_6$	
	175	Caesaldekarin e	$C_{24}H_{30}O_6$	
	176	Caesalmin C	$C_{26}H_{34}O_8$	
	177	Caesalmin G	$C_{20}H_{26}O_5$	
	178	2-acetoxycaesaldekarin e	$C_{26}H_{32}O_8$	
	179	ζ- caesalpin	NA	
	180	Caesalpinin D	$C_{24}H_{30}O_8$	
	181	Caesalpinin E	$C_{25}H_{34}O_8$	
	182	Caesalpinin F	$C_{23}H_{30}O_7$	
	183	Caesalpinin H	$C_{22}H_{28}O_7$	
	184	Caesalpinin I	$C_{22}H_{26}O_7$	
	185	Caesalpinin J	$C_{25}H_{32}O_9$	
	186	Caesalpinin K	$C_{22}H_{32}O_5$	
	187	Caesalpinin M	$C_{25}H_{34}O_9$	
	188	Caesalpinin N	$C_{23}H_{32}O_6$	
	189	Caesalpinin O	$C_{22}H_{28}O_7$	
Not mentioned	190	6β-cinnamoyloxy-7β-acetoxyvoucapen-5α -ol	$C_{31}H_{38}O_6$	[1]
	191	6β-7β-dibenzoyloxyvouacapen-5α-ol	$C_{34}H_{38}O_6$	
	192	7-O methyl-bonducellin	$C_{18}H_{17}O_4$	
	193	Sappanone A	$C_{16}H_{12}O_5$	
	194	4'-O-methyl-sappanoneA	$C_{17}H_{18}O_6$	
Stem and Root	195	Taepeenin A	$C_{21}H_{26}O_3$	[20]
	196	Taepeenin B	$C_{20}H_{24}O_3$	
	197	Taepeenin C	$C_{21}H_{26}O_4$	
	198	Taepeenin D	$C_{23}H_{28}O_5$	
	199	Taepeenin E	$C_{21}H_{24}O_4$	
	200	Taepeenin F	$C_{21}H_{26}O_4$	
	201	Nortaepeenin A	$C_{20}H_{26}O_4$	
	202	Nortaepeenin B	$C_{20}H_{26}O_5$	
	203	Taepeenin G	$C_{20}H_{32}O$	
	204	Taepeenin H	$C_{21}H_{28}O_4$	
	205	Taepeenin I	$C_{21}H_{30}O_4$	
	206	Vinhaticoic acid	$C_{20}H_{28}O_3$	
	207	Methyl vinhaticoate	$C_{21}H_{22}O_3$	
	208	Ent-11-hydroxy-rosa,5,15-diene	$C_{20}H_{32}O$	

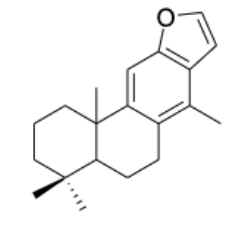
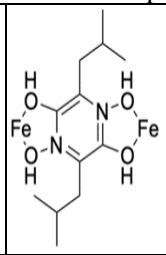
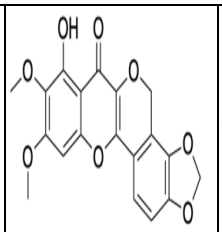
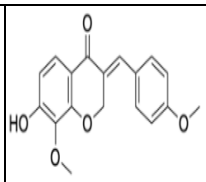
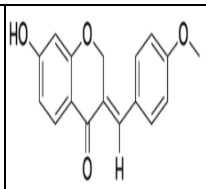
Seed kernels	209	Norcaesalpinin A	$C_{23}H_{30}O_7$	[21]
	210	Norcaesalpinin B	$C_{23}H_{30}O_7$	
	211	Norcaesalpinin C	$C_{23}H_{30}O_7$	
	212	2-acetoxy-3-deacetoxycaesaldekarin e	$C_{24}H_{30}O_6$	
	213	Caesalmin B	$C_{22}H_{28}O_6$	
	214	Caesaldekarin e	$C_{24}H_{30}O_6$	
	215	14(17)-dehydrocaesalpin F	$C_{26}H_{34}O_8$	
Seed kernels	216	1α-acetoxy-5α,7β-dihydroxycassa-11,13(5)-diene-16,12-lactone	$C_{22}H_{30}O_6$	[22]
Leaves	217	Gallic acid	$C_7H_6O_5$	[3]
	218	Protocatecheuic acid	$C_7H_6O_4$	
	219	Catechin	$C_{15}H_{14}O_6$	
	220	Chlorogenic acid	$C_{16}H_{18}O_9$	
	221	Epicatechin	$C_{15}H_{14}O_6$	
	222	Caffeic acid	$C_9H_8O_4$	
	223	Vanillin	$C_8H_8O_3$	
	224	p-coumaric acid	$C_9H_8O_3$	
	225	Sinapic acid	$C_{11}H_{12}O_5$	
	226	Rutin hydrate	$C_{27}H_{32}O_{17}$	
	227	Myricitin	$C_{15}H_{10}O_8$	
	228	Cinnamic acid	$C_9H_8O_2$	
	229	Quercetin	$C_{15}H_{10}O_7$	
	230	Kaemperol	$C_{15}H_{10}O_6$	
	231	Decane	$C_{10}H_{22}$	
	232	2,3–Dihydro–benzofuran	C_8H_8O	
	233	Resorcinol	$C_6H_6O_2$	
	234	Megastigmatrienone	$C_{13}H_{18}O$	
	235	Mono inositol	$C_6H_{14}O_{12}P_2$	
	236	Neophytadiene	$C_{20}H_{38}$	
	237	2–Pentadecanone, 6,10,14–trimethyl–	$C_{18}H_{36}O$	
	238	2–Hexadecen–1–ol, 3,7,11,15–Tetramethyl	$C_{20}H_{40}O$	
	239	3,7,11,15–Tetramethyl–2–hexadecen–1–ol	$C_{20}H_{40}O$	
	240	Hexadecanoic acid, methyl ester	$C_{17}H_{34}O_2$	
	241	Hexadecanoic acid, ethyl ester	$C_{18}H_{36}O_2$	
	242	Phytol	$C_{20}H_{40}O$	
	243	n–Propyl 9,12–octadecadienoate	$C_{21}H_{38}O_2$	
	244	9,12,15–Octadecatrienoic acid, 2,3–dihydroxypropyl ester,	$C_{21}H_{36}O_4$	
	245	Octadecanoic acid, ethyl ester	$C_{20}H_{40}O_2$	
	246	4,8,12,16–Tetramethylheptadecan–4–Olide	$C_{21}H_{40}O_2$	
	247	1,2–Benzenedicarboxylic acid, 1,2–bis(2–ethylhexyl) ester	$C_{24}H_{38}O_4$	
	248	Cholesta–9(11), 20(22)–diene–3, 23–dione, 6–hydroxy–	$C_{27}H_{40}O_3$	
	249	Hexacontane	$C_{60}H_{122}$	
	250	Tetrapentacontane	$C_{54}H_{110}$	
	251	Hexatriacontane	$C_{36}H_{74}$	
	252	Squalene	$C_{30}H_{50}$	
	253	2,8–Dimethyl–2–(4,8,12–trimethyltridecyl)–6–chromanol	$C_{27}H_{46}O_2$	

	254	β –Sitosterol	$C_{29}H_{50}O$	
	255	β –Amyrin	$C_{30}H_{50}O$	
	256	Vasicionolone	$C_{11}H_{10}N_2O_3$	
	257	Derriobtusone A	$C_{18}H_{12}O_4$	
	258	6-Methoxykaempferol	$C_{16}H_{12}O_7$	
	259	Quercetin-3-methyl ether	$C_{16}H_{12}O_7$	
	260	Myricetin-3’3’4’-trimethyl†ether	$C_{18}H_{16}O_8$	
	261	Chrysosplenol D	$C_{18}H_{16}O_8$	
	262	Catechin-7-O-gallate	$C_{22}H_{18}O_{10}$	
	263	-Epicatechin-3-O-gallate	$C_{22}H_{18}O_{10}$	
	264	Epigallocatechin 3-O-3¨5-di-O-methylgallate	$C_{24}H_{22}O_{11}$	
	265	Demethoxyisogemichalcone C	$C_{29}H_{26}O_8$	
	266	Quercetin-7-6’’-tiglylglucoside	$C_{26}H_{26}O_{13}$	
	267	Quercetin 3-(2’3’4’’-Triacetylgalactoside)	$C_{27}H_{26}O_{15}$	
	268	Acacetin 7-(4’’’-acetylrutinoside)	$C_{30}H_{34}O_{15}$	
	269	Kaempferol 3-(4’6’’-Diacetylglucoside)-7-rhamnoside	$C_{31}H_{34}O_{17}$	
	270	Pre phytoenediphosphate	$C_{40}H_{68}O_7P_2$	
	271	Palargonidin 3-(6’’-Ferulylglucoside)-5-(6’-Malonylglucoside)	$C_{40}H_{41}O_{21}$	
	272	Kaempferol 3-neohesperidoside-7-(6’’-malonylglucoside)	$C_{37}H_{44}O_{24}$	
	273	Quercetin 3-(2’-pcoumarylsambubioside)-7- glucoside	$C_{41}H_{44}O_{23}$	
	274	Methyl(+)-7 isojasmonate	$C_{13}H_{20}O_3$	
	275	Kaempferol 7.4’-dimethyl ether	$C_{17}H_{14}O_6$	
	276	3’4’-Methvlenedioxy epicatechin 5,7-dimethyl ether	$C_{18}H_{18}O_6$	
	277	Myricetin 5-methyl ether	$C_{16}H_{12}O_8$	
	278	Catechin 5,7,.4’-trimethyl ether	$C_{18}H_{20}O_6$	
	279	Epicatechin5.7.3’-trimethyl ether	$C_{18}H_{20}O_6$	
	280	Kaempferol 3-(3’’,4’’-diacetylrhamnoside)	$C_{25}H_{24}O_{12}$	
	281	Kaempferol 3,7,4’-tri-O-sulfate	$C_{15}H_{10}O_{15}S_3$	
	282	Myricetin-3-rutinoside	$C_{27}H_{30}O_{17}$	
	283	Quercetin7’,4’-diglucoside	$C_{27}H_{30}O_{17}$	
	284	6-Hydroxykaempferol 7-(6”-(E)-caffeyl glucoside)	$C_{30}H_{26}O_{15}$	
	285	Stigmasteryl ester	$C_{47}H_{78}O_2$	
	286	Chrysosplenol C 6,4’-diglucoside	$C_{30}H_{36}O_{18}$	
	287	8-Prenylquercetin 4’-methyl-ether 3-rhamnoside	$C_{27}H_{30}O_{11}$	
Flowers	288	3, 5, 7, 3’, 4’-pentahydroxy flavanone-3-O-β-D-xylopyranosyl-7-O-α-L-arabinopyranosyl-(1→3)-O-α-Lrhamnopyranoside	$C_{31}H_{38}O_{19}$	[23]
	289	4’-hydroxy-5, 7-dimethoxy flavone-4’-O-β-D-xylopyranosyl-(1→3)-O-β-D-glucopyranosyl-(1→4)-O-α-L-rhamnopyranoside	$C_{34}H_{42}O_{18}$	
	290	5, 2’-dihydroxy-6, 7-dimethoxy isoflavone	$C_{17}H_{14}O_6$	
	291	3, 5, 7, 3’, 4’ ,5’-hexahydroxy flavone	$C_{15}H_{10}O_8$	
Leaves	292	Neocaesalpin H	$C_{20}H_{28}O_5$	[24]
	293	Neocaesalpin I	$C_{20}H_{26}O_4$	
Seeds	294	Phangininoxy D	$C_{23}H_{32}O_6$	[25]

	295	Phangininoxy E	$C_{23}H_{32}O_5$	
	296	Caesalpinista A	$C_{21}H_{30}O_5$	
	297	Caesalpinista B	$C_{23}H_{32}O_6$	
	298	Caesalpinin MP	$C_{22}H_{28}O_4$	
	299	Caesalpinilinn	$C_{21}H_{26}O_5$	
	300	Phanginin I	$C_{21}H_{28}O_4$	

Yang et al. isolated five cassanediterpes from the seed of *C. crista* L. The isolated compounds were caesalpinistaA, caesalpinista B, caesaljapin B, caesaljapin C and caesalpinilinn [16]. Reported physicochemical and pharmacological standardization of the root of *C. crista* L. The study gave an overview of the root's taste and smell at a macroscopic sslevel. *Caesalpinia crista* L. contains a large amount of phytoconstituents that have hundreds of medicinal uses. Table 1 gives the name of the part of the plant and the chemical compounds found in it with their molecular formula. Along with this, the structures of all those chemical compounds are drawn in Table 2.

Table 2. Chemical structures of phytoconstituents found in *C. crista* L.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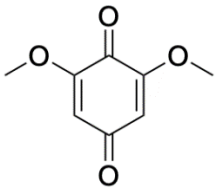	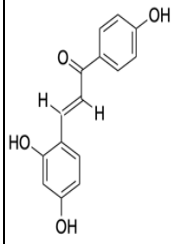	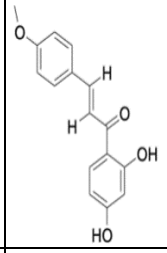	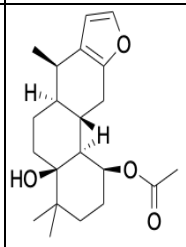	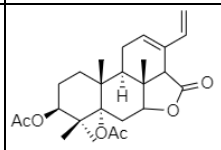
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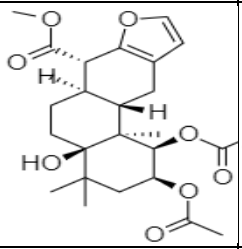	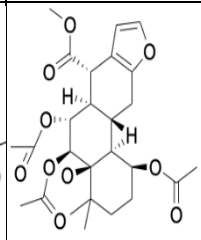	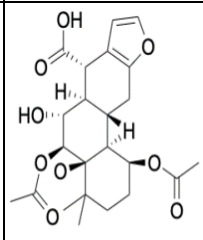	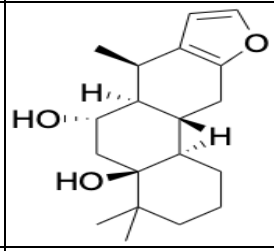	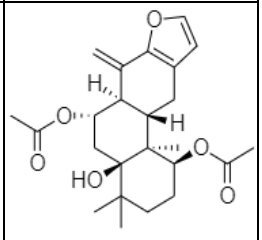
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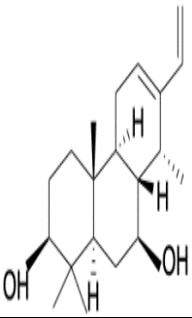	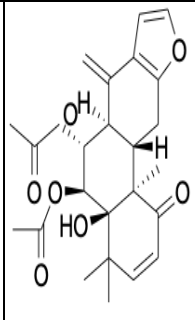	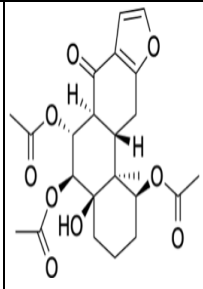	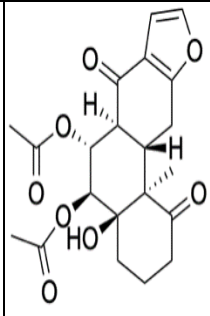	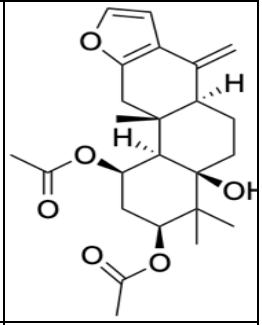
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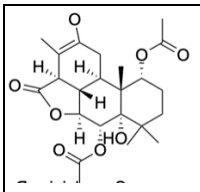	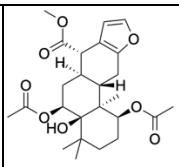	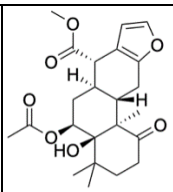	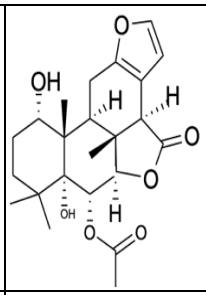	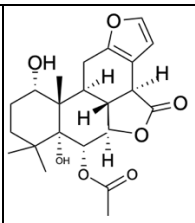
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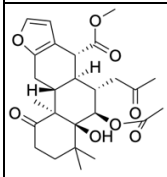	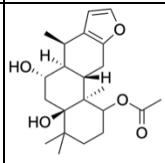	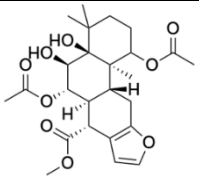	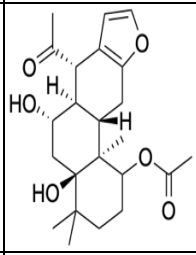	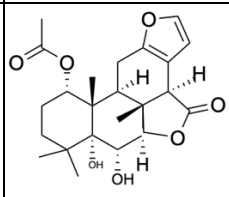
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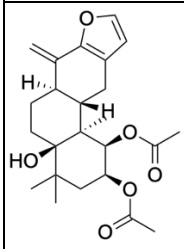	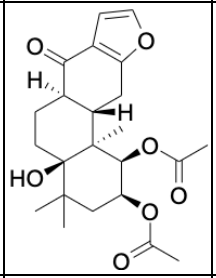	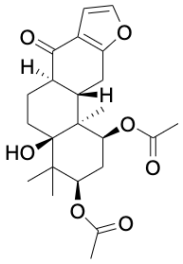	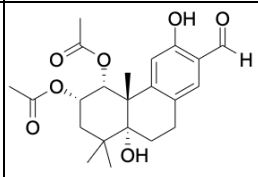	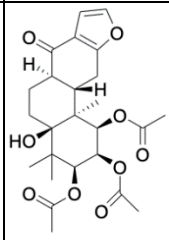
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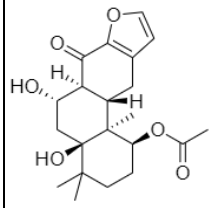	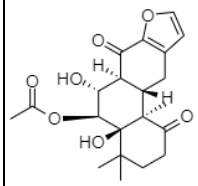	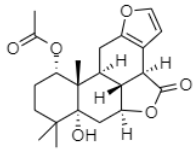	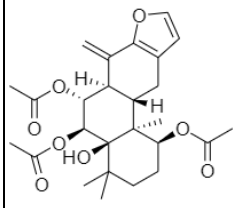	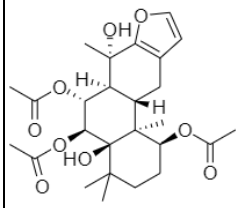
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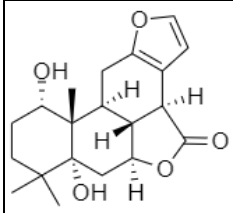	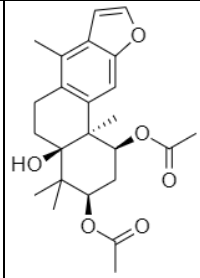	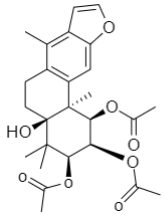	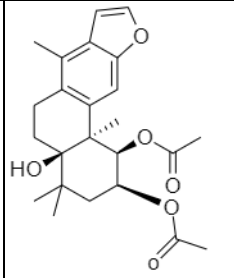	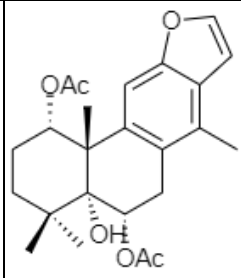
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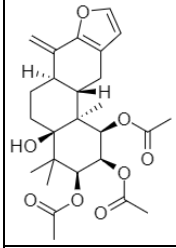	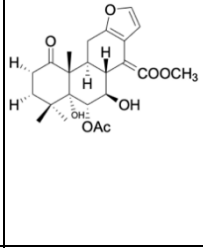	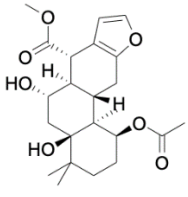	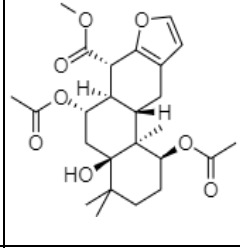	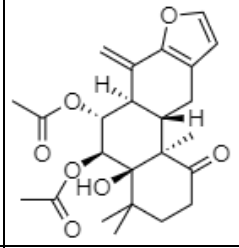
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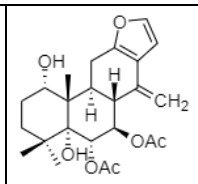
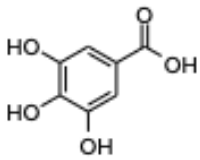
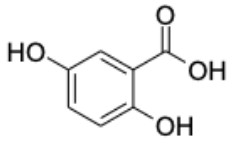
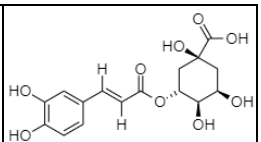
NA				
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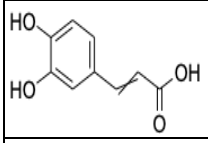	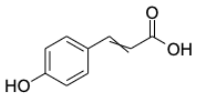	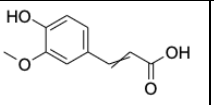	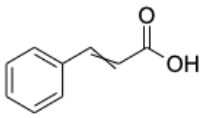	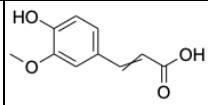
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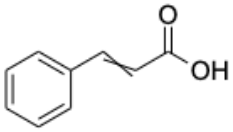	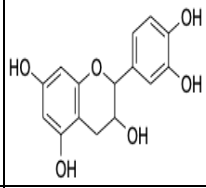	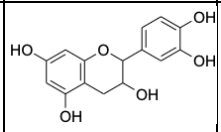	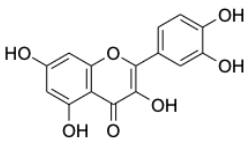	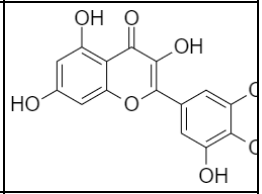
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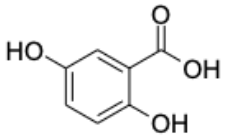	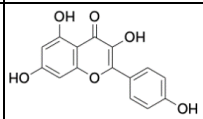	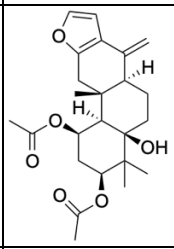	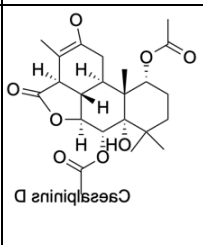	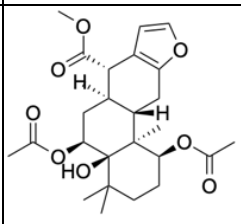
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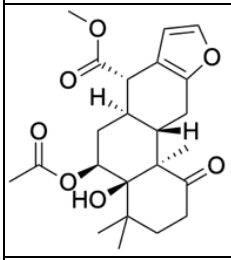	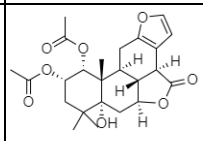	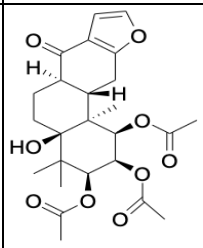	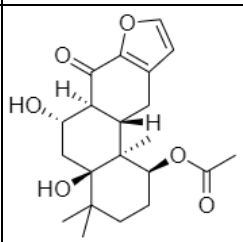	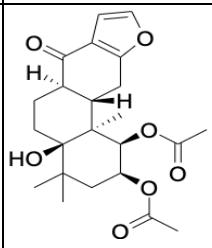
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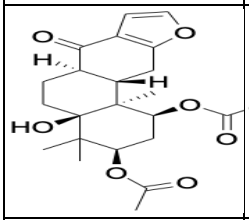	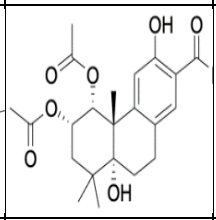	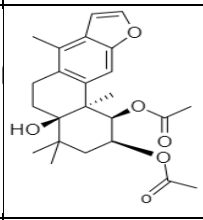	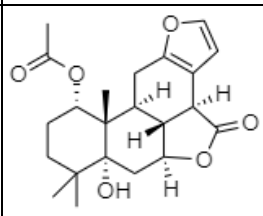	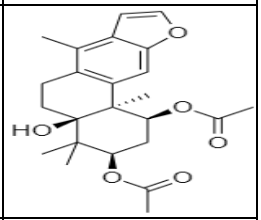
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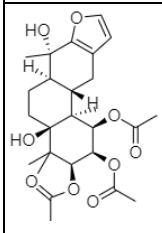	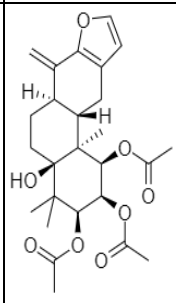	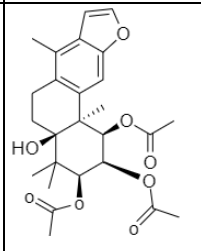	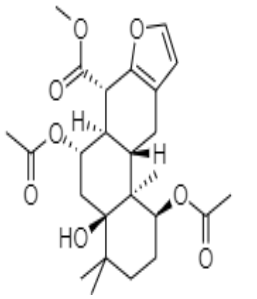	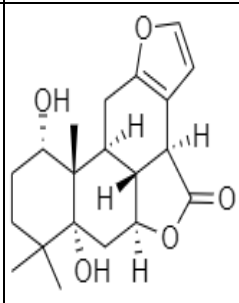
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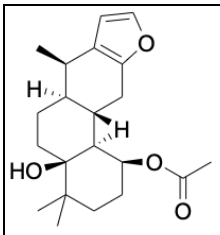
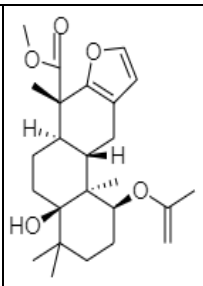
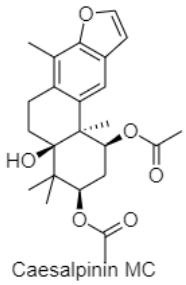
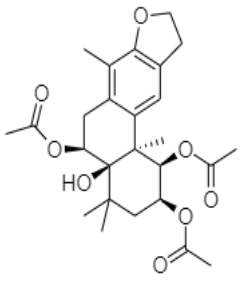
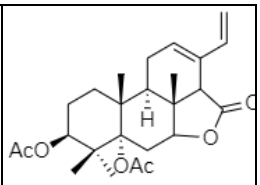
		 Caesalpinin MC	 Caesalpinin MD	
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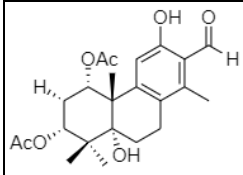	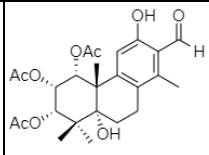	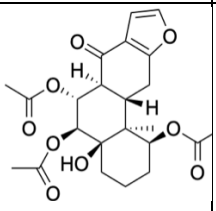	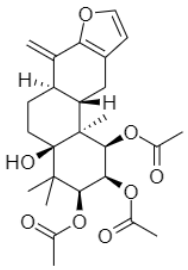	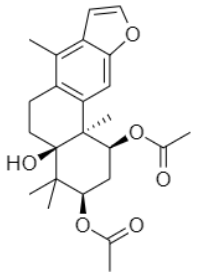
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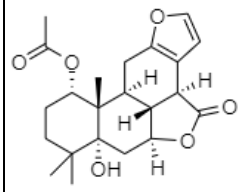	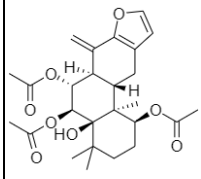	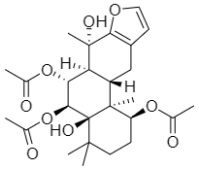	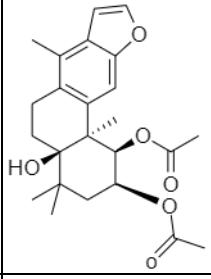	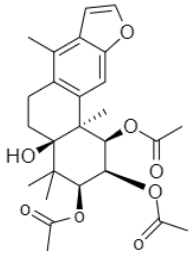
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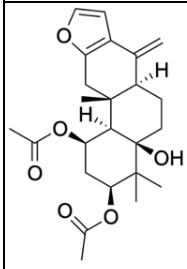	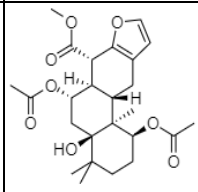	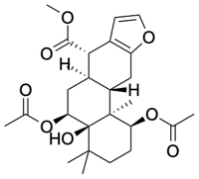	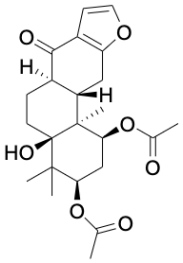	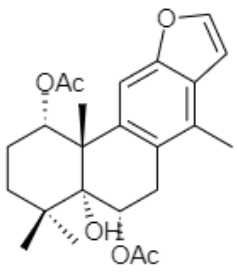
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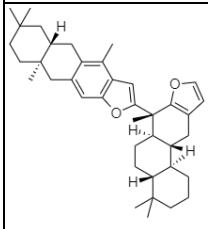	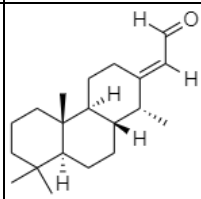	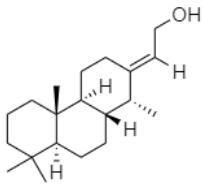	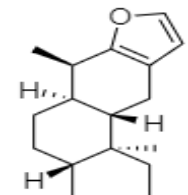	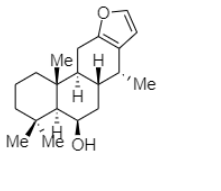
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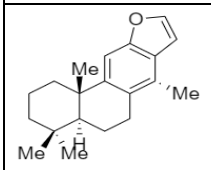	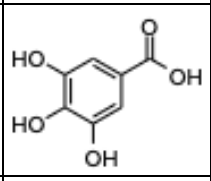	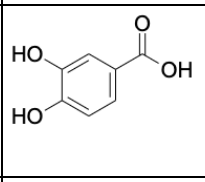	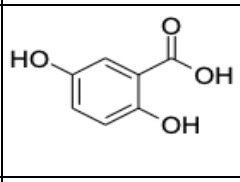	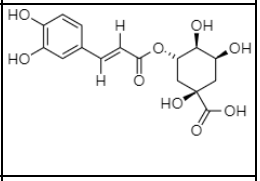
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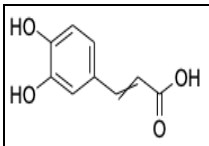	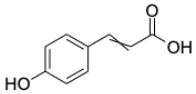	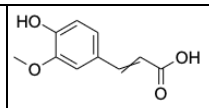	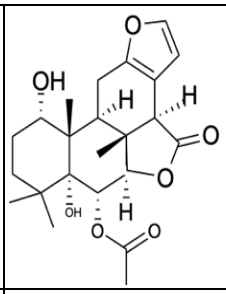	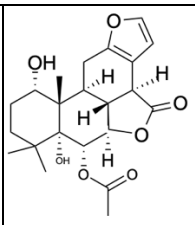
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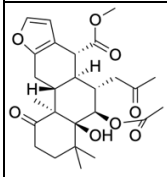	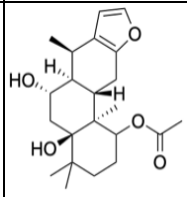	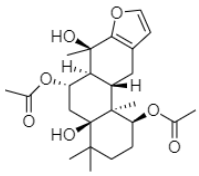	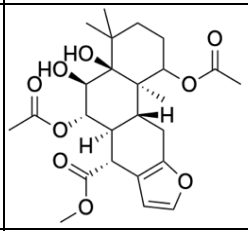	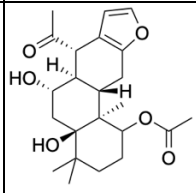
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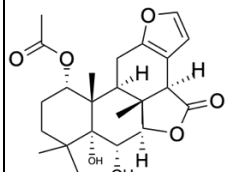	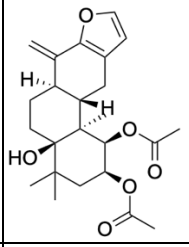	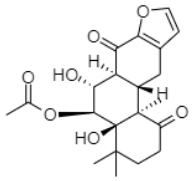	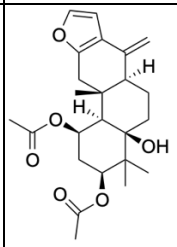	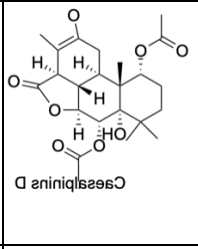
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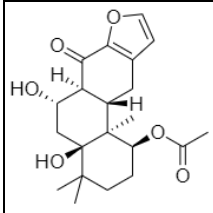	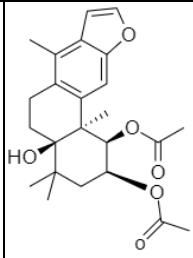	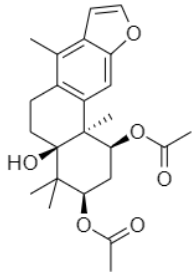	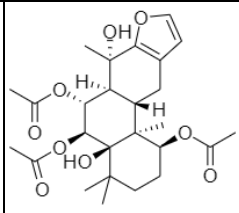	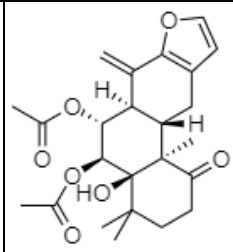
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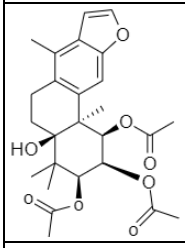
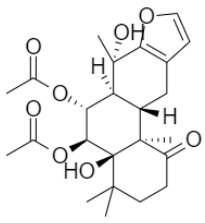
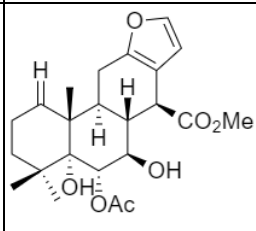
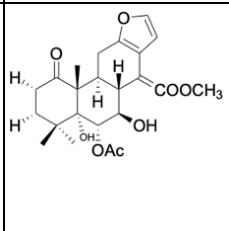
	NA			
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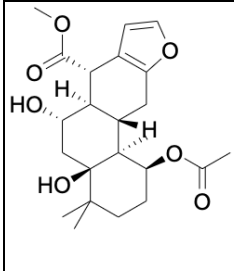	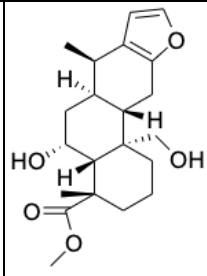	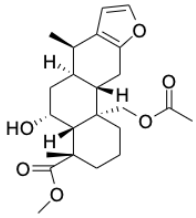	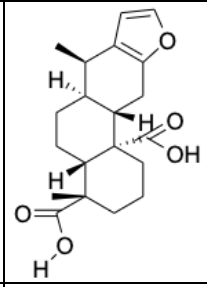	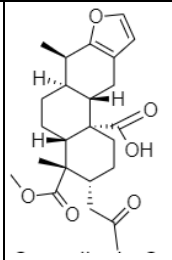
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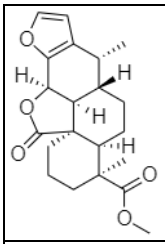	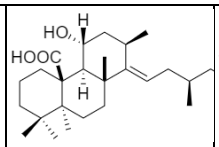	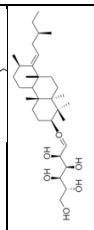	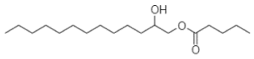	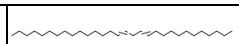
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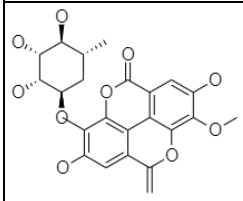	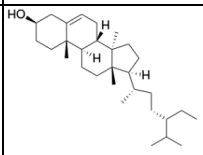	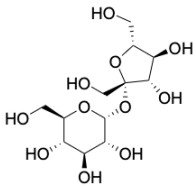	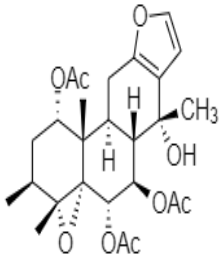	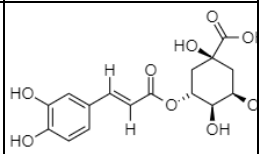
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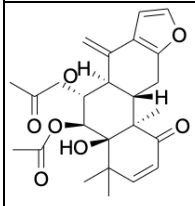	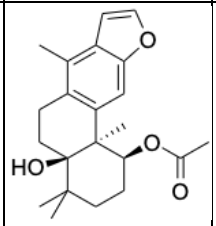	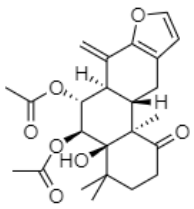	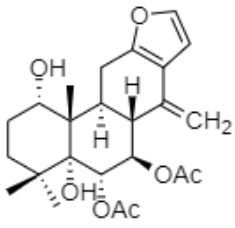	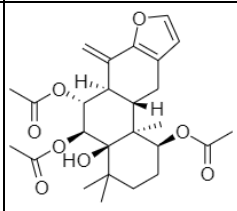
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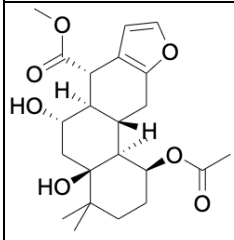	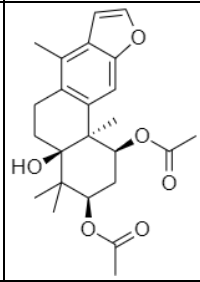	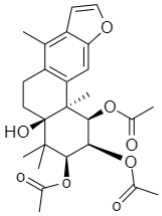	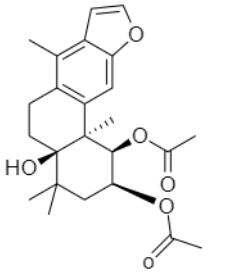	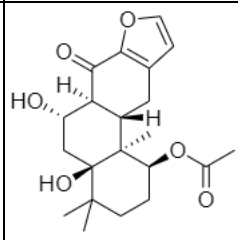
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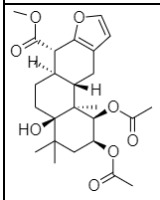	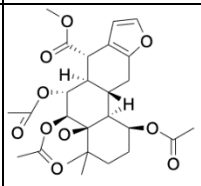	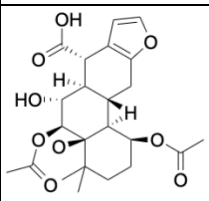	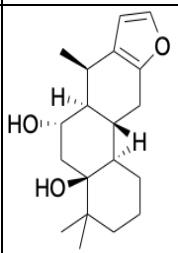	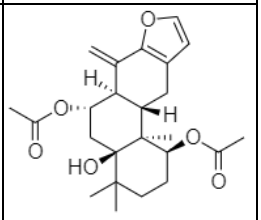
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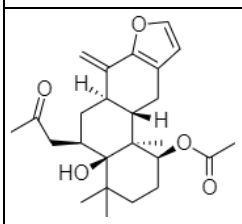	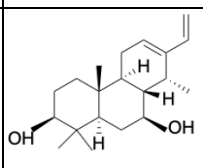	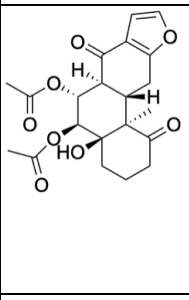	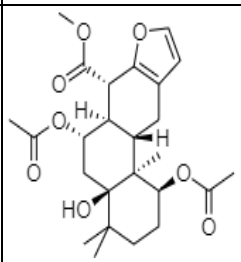	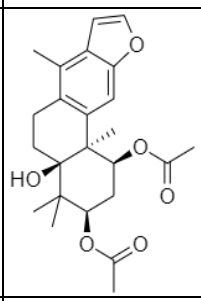
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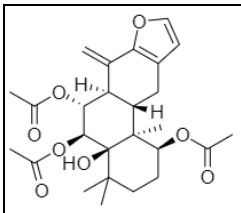
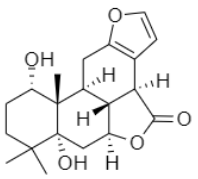
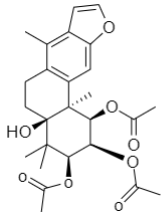
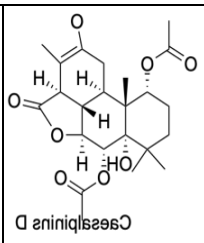
			NA	
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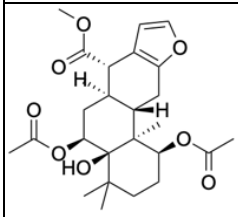	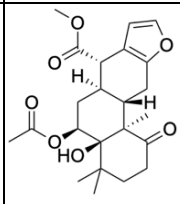	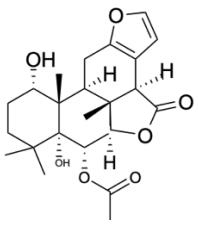	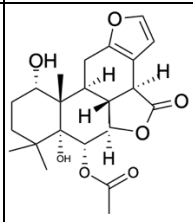	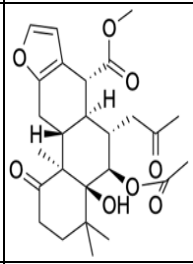
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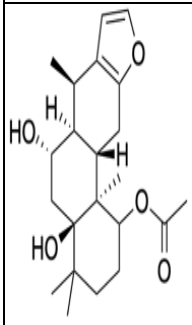	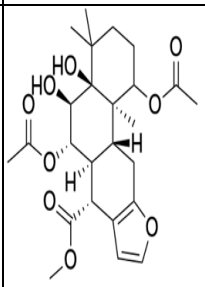	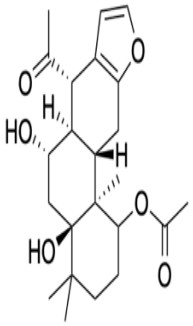	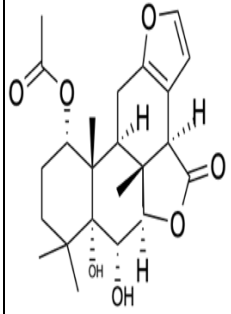	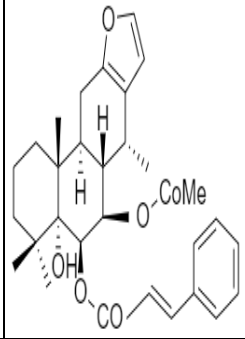
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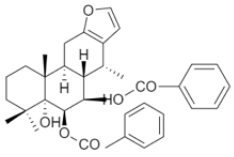	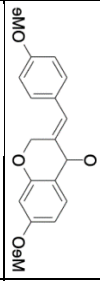	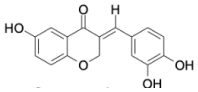	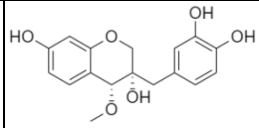	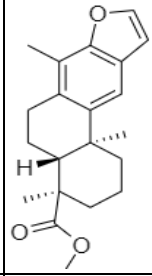
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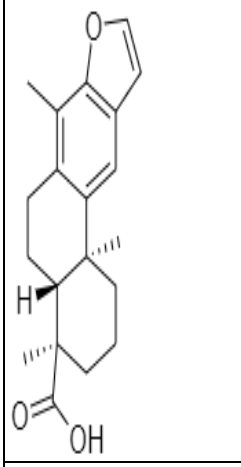	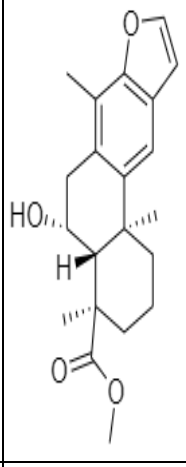	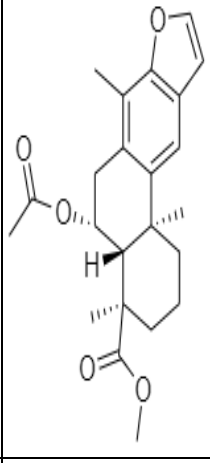	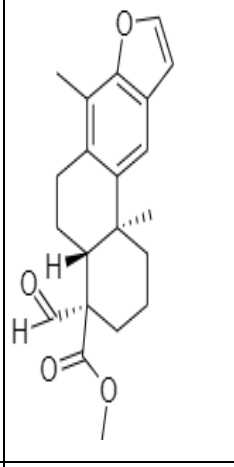	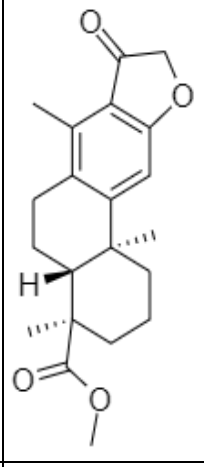
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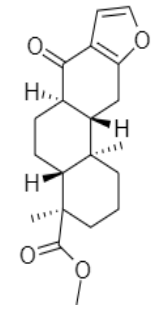	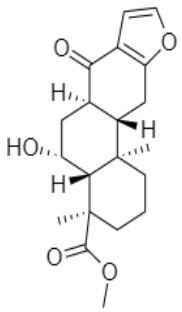	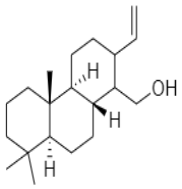	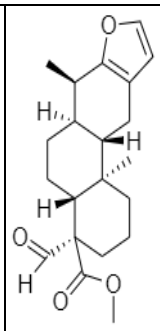	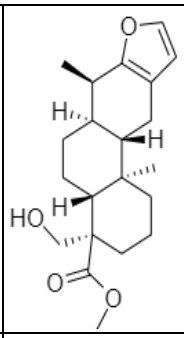
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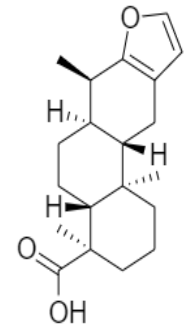	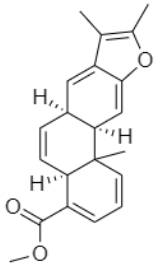	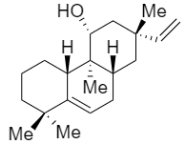	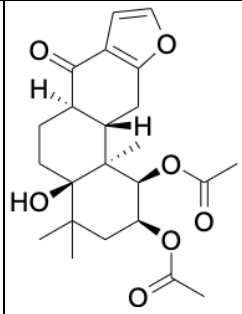	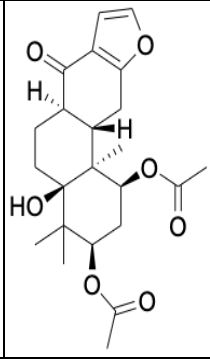
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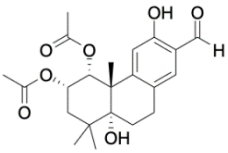	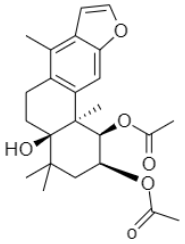	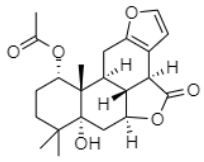	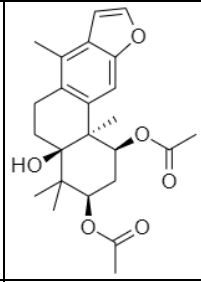	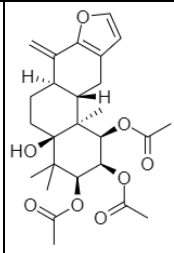
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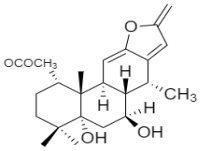	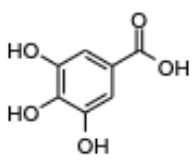	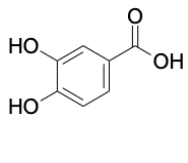	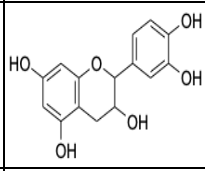	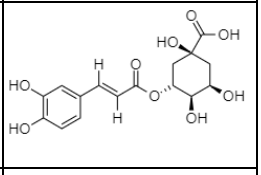
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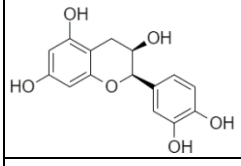	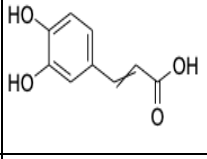	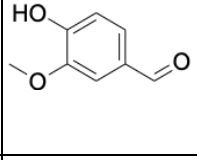	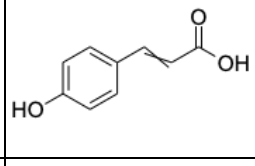	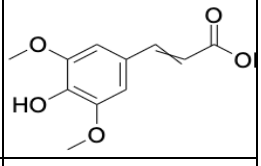
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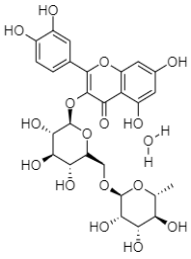	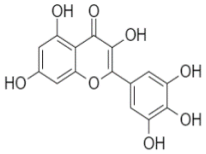	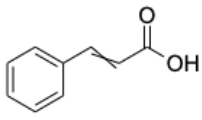	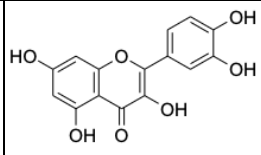	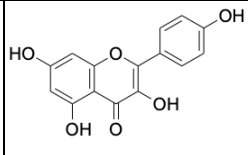
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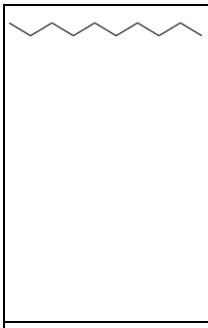	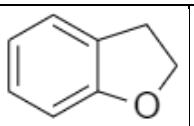	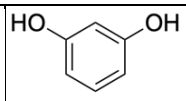	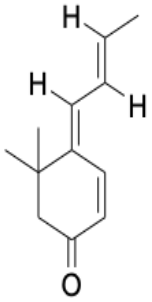	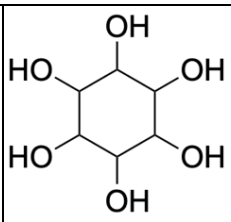
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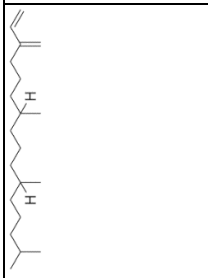	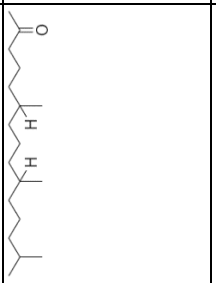	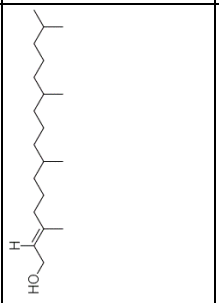		
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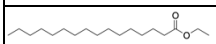	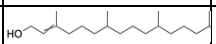	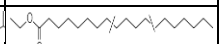	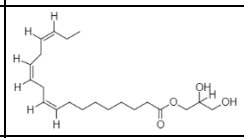	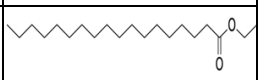
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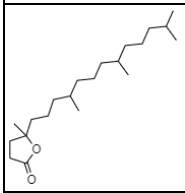	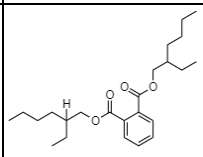	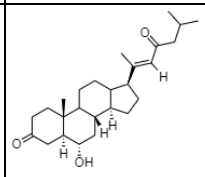	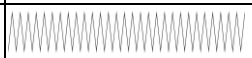	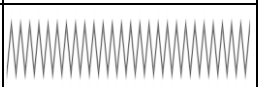
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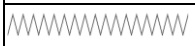		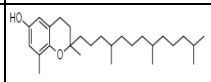	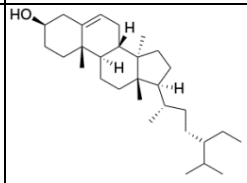	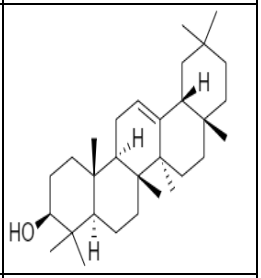
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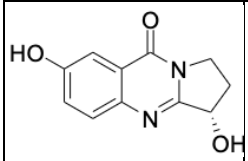	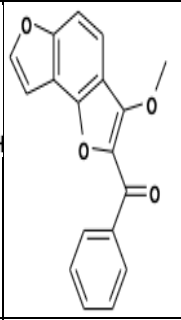	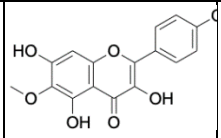	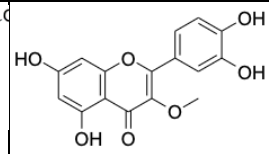	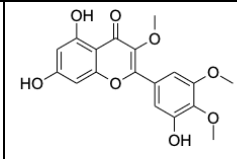
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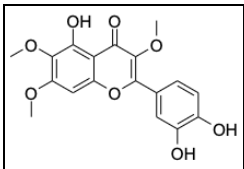	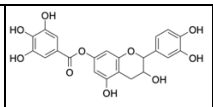	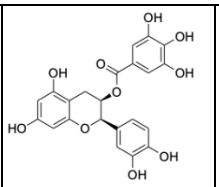	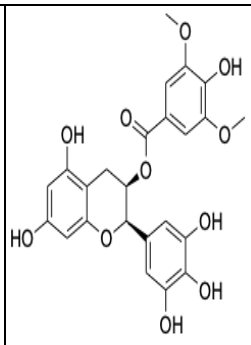	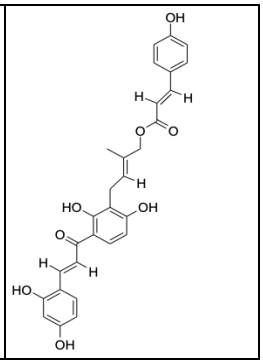
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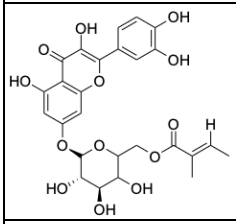	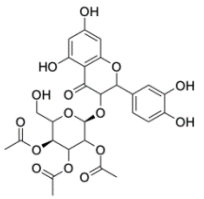	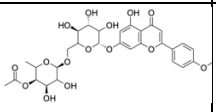	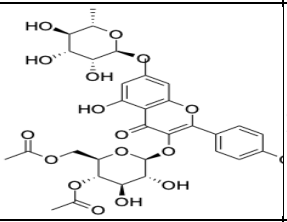	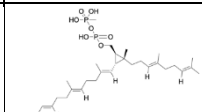
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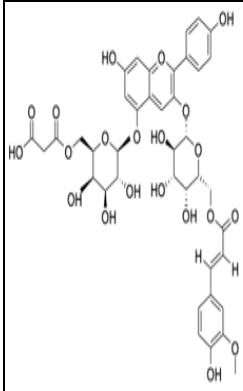	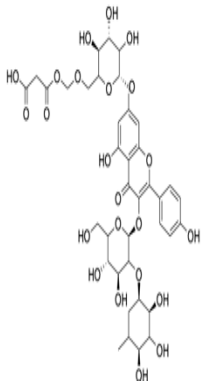	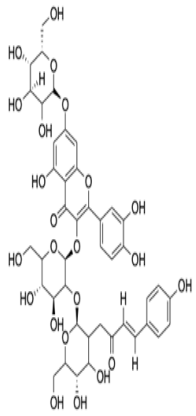	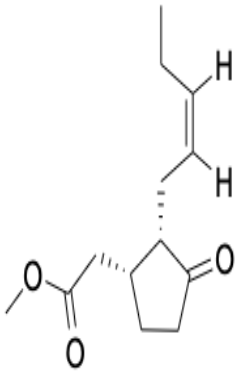	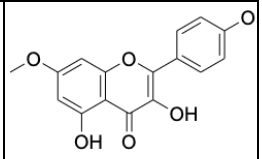
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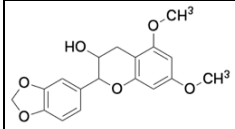	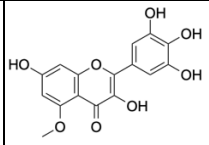	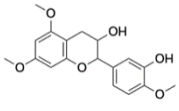	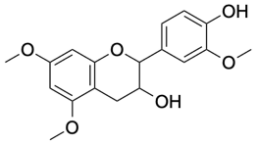	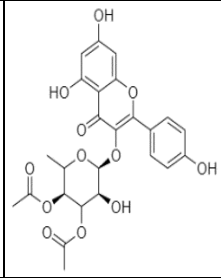
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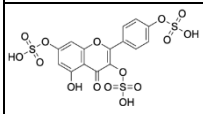
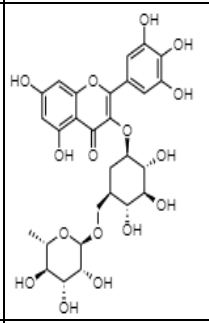
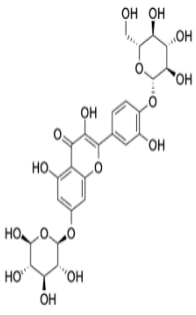
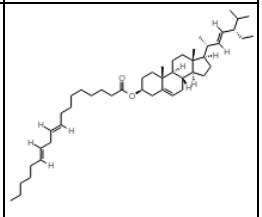
			NA	
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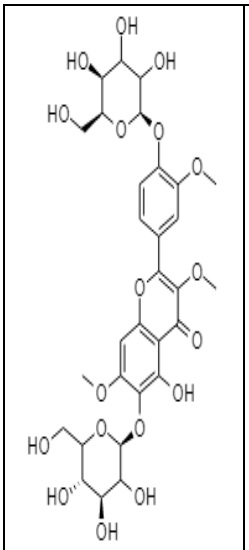	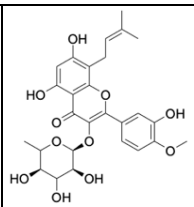	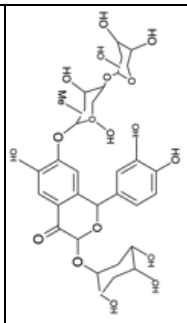	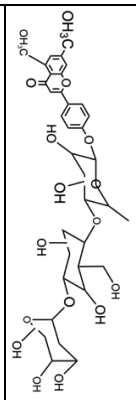	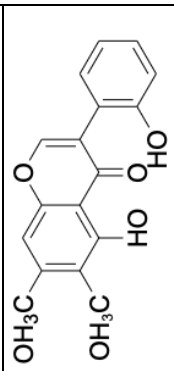
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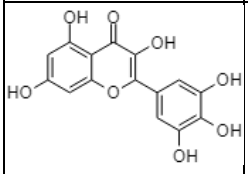	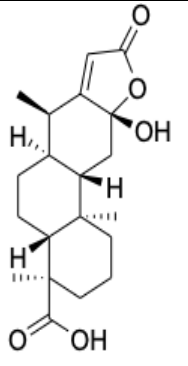	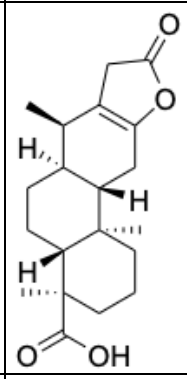	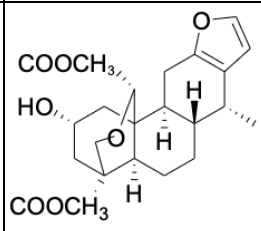	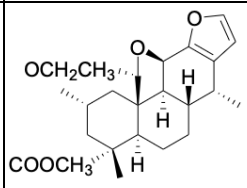
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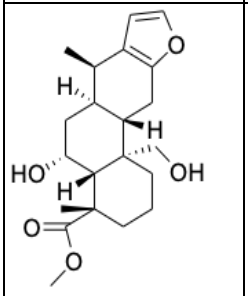	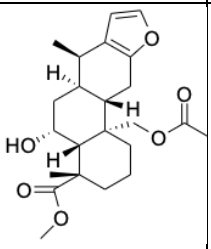	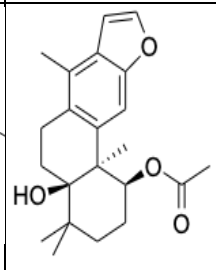	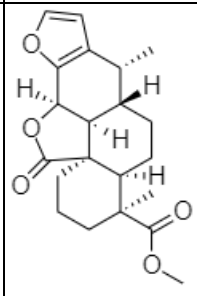	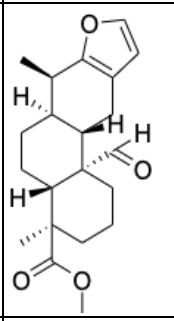
296	297	298	299	300

Note: NA- Not available. Chemical structures are redrawn from: ChemDraw and www.pubchem.ncbi.nlm.nih.gov.

SUMMARY AND CONCLUSIONS

Caesalpinia crista L. is a well-known and important herb. It possesses antioxidant, analgesic, anti-filarial, antidiabetic, anti-inflammatory, hypolipidemic, antimalarial, anthelmintic, antipyretic, and hypolipidemic properties. Many illnesses can be treated using leaves, seeds, and even seed kernels. Pharmacogenetic factors found in sugars, glycosides, alkaloids, tannins, and flavonoids are used to distinguish and standardize crude medications. This illustrates the healing effect of plants. The phytoconstituents include alpha-caesalpin, which may be an anti-diabetic drug; these plants may offer cutting-edge cancer treatments. Significant antibacterial action from isolated chemical compounds was also demonstrated. More research is needed to fully understand the efficacy and variety of this plant's therapeutic potential. Due to its efficacy and safety, *C. crista* L. is a viable source for new drugs to treat human maladies. This is because it contains a variety of chemical components, which are listed above.

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