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Kimyo fanlari bo‘yicha falsafa doktori (PhD), R.R.Maxmudov taqrizi asosida

DIOSPYROS KAKI L. – CHEMICAL COMPOSITION OF THE LEAVES OF THE ORIENTAL PALM PLANTS

Annotation

An optimal method for extracting polyphenols from the leaves of Diospyros kaki l was established. The chemical compositions of the ethylacetate fraction was studied by the HPLC method with standart substances. It was found that this fraction contains compounds such as dihydroquercetin 2.13, luteolin 1.12, quercetin 0.58, rutin 36.18, synaroside 0.57, apigenin 4.50 mg/g.
Key words: UV, IR, HPLC, flavonoid, extraction, extractant, Diospyros kaki l.

DIOSPYROS KAKI L.- ХИМИЧЕСКИЙ СОСТАВ ЛИСТЬЕВ ВОСТОЧНОЙ ПАЛЬМЫ

Аннотация

Установлен оптимальный метод извлечения суммы полифенолов из листьев Diospyros kaki l. При изучении состава этилацетатной фракции методом ВЭЖХ в присутствии стандартных веществ было установлено, что в данной фракции содержатся такие соединения, как дигидрокверцетин 2,13, лютеолин 1,12, кверцетин 0,58, рутин 36,18, синарозид 0,57, апигенин 4,50 мг/г.
Ключевые слова: УФ, ИК, ВЭЖХ, флавоноид, экстракция, экстрагент, Diospyros kaki l.

DIOSPYROS KAKI (L) SHARQ XURMOSI BARGLARINING KIMYOVIY TARKIBI

Annotatsiya

Diospyros kaki l.- sharq xurmosi barglaridan polifenollar yig‘indisini ajratib olishning maqbul usuli izlab topildi. Etilasetatli fraksiyasi tarkibi YSSX usulida guvox moddalar ishtirokida tekshirilganda ushbu fraksiya tarkibida digidrokversetin 2.13, lyuteolin 1.12, kversetin 0.58, rutin 36.18, sinarozid 0.57, apigenin 4.50 mg/g kabi birikmalar bor ekanligi aniqlandi.
Kalit so‘zlar: UB, IQ, YSSX, flovonoid, ekstraksiya, ekstragent, Diospyros kaki l.

Kirish. Bugungu kunda aholining tabiiy dori vositalariga bo‘lgan ehtiyoji kun sayin ortib bormoqda. Shunday ekan, tarkibi vitaminga boy meva va sabzavotlar bilan bir qatorda noyob kimyoviy tuzilishga ega bo‘lgan biologik faol birikmalar saqlovchi dorivor o‘simliklarni tanlash, shuningdek, ikkilamchi mahsulotlardan to‘laqonli foydalanish masalalarini o‘z ichiga olgan holda, ularni qayta ishlashning zamonaviy kompleks texnologiyalarini ishlab chiqish farmasevtika sohasining dolzarb vazifalaridan biri bo‘lib qolmoqda. Ikkilamchi mahsulotlarni qayta ishlash maqsadida ishlab chiqilayotgan yangi texnologiyalar nafaqat ma’lum o‘simlik turlaridan foydalanish masalalarini kengaytirish, balki yangi o‘simlik turlaridan foydalanish, shuningdek, iqtisodiy samarador, xavfsiz va terapevtik samarador dori vositalari turini ko‘paytirishga xizmat qiladi.

Meva va sabzavotlar inson ratsionining muhim tarkibiy qismi bo‘lib, inson salomatligini saqlashda muhim rol o‘ynaydi. Ularning foydali xususiyati tarkibidagi biologik faol birikmalar, makro-mikroelementlar miqdori bilan belgilanadi. Fitokimyoviy moddalar sonining ko‘pligi va turli biologik faolliklarni namoyon qilishi ularga bo‘lgan qiziqishlarni orttirib, tadqiqotchilar e'tiborini jalb qiladi. Xurmo (Diospyros kaki L.) kuchli antioksidant ta'sirga ega bo‘lgan to‘yimli mevalardan biridir[1]. Xurmo qurg‘oqchilikni qat'iyan qabul qilmaydi, tuproq yaxshi namlangan bo‘lishi kerak, shunda mevalarning o‘sishi va pishishi va o‘rim-yig‘imdan keyin ildiz tizimining keyingi dam olishi uchun etarli kuch bo‘lishi kerak.

Mavzuga oid adabiyotlar tahlili. Xurmo- *Ebenaceae* oilasiga mansub meva. U odatda dunyoning issiq mintaqalarida, jumladan Xitoy, Koreya, Yaponiya, Braziliya, Turkiya va Italiyada etishtiriladi. Umuman olganda, dunyo bo‘ylab xurmoning 400 dan ortiq turlari ekilgan. Bular orasida Diospyros kaki, Diospyros virginiana, Diospyros oleifera va Diospyros lotus kabi turlari muhim ahamiyatga ega hisoblanib kelmoqda. D. kaki (yapon (sharq) xurmosi) eng istiqbolli tur bo‘lib O‘zbekistonda ham keng tarqalgan. Xurmo mevasi tarkibida 17–20% glyukoza uchraydi. Pishib yetilgan xurmo mevasi tarkibida nisbatan yuqori miqdorda C vitamini, temir tuzlari va juda kam miqdorda kislota (0,05-0,20%) mavjud. Taxirlik-mevani tarkibida tanin moddasi mavjudligini bildirib, uning miqdori mevada 0,1–1,5% tashkil qiladi. Xurmoning boy fitokimyoviy tarkibi uni turli kasalliklar, jumladan antioksidant, giperxolesterolemiya, qandli diabet, saraton, teri kasalliklari, gipertoniya va boshqalarga samarali qo‘llash

istiqbollarini ochib beradi. So‘nggi yillarda olib borilgan tadqiqotlar natijasida xurmo daraxti barglari ham biofaol moddalarga, ayniqsa polifenol birikmalarga boy ekanligini ko‘rsatmoqda[2].

Tadqiqot metodologiyasi. Ana shu ma’lumotlarga tayangan xolda respublikamizda yetishtiriluvchi taxir mevali xurmo (Xiakume navi) daraxti barglarining kimyoviy tarkibi o‘rganildi[4].

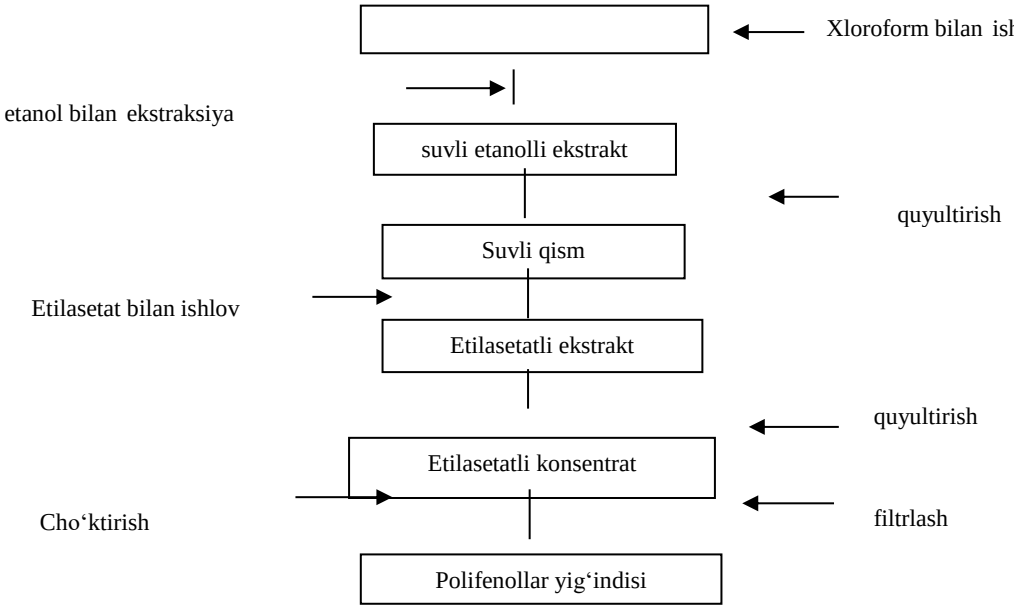
Diospyros kaki o‘simlik xom ashyosidan quyu haroratda, kam vaqt sarflab, yuqori unum va sifatga ega bo‘lgan polifenollar yig‘indisini ajratib olishning maqbul usuli izlab topildi. O‘simlik xom ashyosidan biologik faol moddalarni ajratib olishda ekstraksiya jarayoni muhim ahamiyatga ega bo‘lib, bu jarayonga ko‘plab omillar ta’sir qiladi. Ekstraksiya jarayoniga ta’sir etuvchi omillar sifatida quyudagilar tanlandi: ekstraksiya moduli (xom ashyo va ekstragent o‘rtasidagi nisbat); ekstraksiyalash takroriyligi; ekstragent tarkibi; ekstraksiya harorati, hom ashyoning maydalanganlik darajasi (1-jadval).

1-jadval

Diospyros kaki l. o‘simligidan polifenollar yig‘indisini ajratib olishning turli parametrlarga bog‘liqligi

Omillar	birligi	O‘rganilgan omillar darajasi	Maqbul sharoit
Hom ashyoningning maydalanganlik darajasi	мм	0,5-1; 1-3; 3-5; 5-7; 8-10	3-5
Ekstragent tarkibi (etanol)	%	10, 20,30,40,50, 60, 70, 80, 90, 96	40
Harorat	ºC	25, 35, 45, 55, 65	45
Ekstraksiya takroriyligi		1, 2, 3, 4, 5	3
Ekstraksiya vaqti	soat	1, 2, 3, 4, 5	3
Ekstraksiya moduli	nisbat	1:2, 1:4, 1:6, 1:8, 1:10	1:8

1-jadvalda keltirilgan har bir omillarni tajribalarda 5 marta takrorlab, o‘rtacha qiymatlar hisoblandi va olingan natijalar asosida o‘simlik xom ashyosidan polifenollar yig‘indisini ajratib olishning maqbul usuli sifatida osimlikning maydalanganlik darajasi 1-5 мм, ekstraksiya 45^0C haroratda, 3 soat davomida, 1:8 nisbatda, 40% etanolda, 3 marotaba takroriylikda ekstraksiya qilib yuqori unum va sifatga ega bo‘lgan polifenollar yig‘indisi ajratib olindi [4]. Ushbu natijalarga asoslanib quyudagi sxema yordamida o‘simlik xom ashyosida polifenollar yig‘indisi ajratib olindi(1-sxema).



1-Sxema. Diospyros kaki l. o‘simligidan polifenollar ajratib olish sxemasi

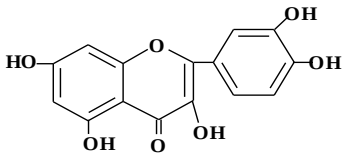
Tahlil va natijalar. Tahlil natijalariga ko‘ra Diospyros kaki barglari tarkibida umumiy polifenollar miqdori 100 gramm o‘simlik quruq massasiga nisbatan-1,33% ni tashkil qildi[6]. Ajratib olingan polifenollar yig‘indisi kolonkali xromatografiya usuli yordamida 3 ta fraksiyaga ajratib olindi. Birinchi fraksiya tarkibi YSSX usulida standart moddalar ishtirokida tekshirilganda flavonoidlar sinfiga kiruvchi moddalar mavjudligi va ularning miqdori aniqlandi (2-jadval).

2-jadval

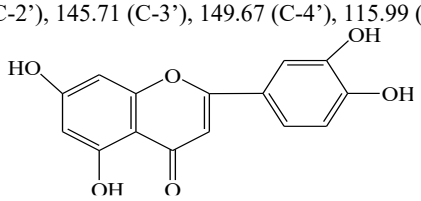
Diospyros kaki l. bargi polifenollari tarkibi

Flavonoidlar	**Konsentratsiya, mg/g**
Digidrokvertsetin	2,13
Lyuteolin	1,12
Kversetin	0,58
Rutin	36,18
Sinarozid	0,572
Apigenin	4,5

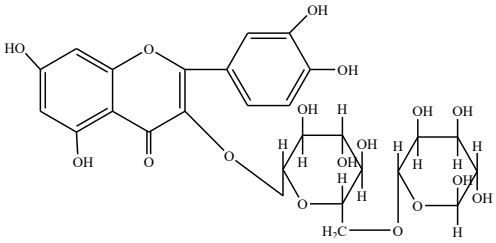
Kversetin - $C_{15}H_{10}O_7$, Мм 302, sariq rangli kristall modda, R_f 0,64 (3-система, 73-б.), Suyuq.x. 314-316^{0}C, $[\alpha]^{20}_D$=-69^0 (c 0,2, EtOH). UB-spektr (EtOH, λ_{max} nm): 256, 264, 372 (CH_3COONa, $\lambda_{max,}$ нм): 384, 374 (CH_3COONa+H_3BO_3, $\lambda_{max,}$ нм): 390, 259 ($AlCl_3$, $\lambda_{max,}$ нм): 458, 252. IQ-spektr (ν, см$^{-1}$): 3380, 3300 (OH), 1665 (>C=O), 1615, 1565, 1515 (Ar), 815, 840 (*p*-almashingan “B” halqa). ^{1}H ЯМР спектри (600 МГц, DMSO, δ, м.у): 7.71 (1H, д, J=1.8, H-2'), 7.53 (1H, дд, J=1.8; 9.0, H-6'), 6.89 (1H, J=9.0, H-5'), 6.40 (1H, д, J=2.4, H-8), 6.18 (1H, д, J=2.4, H-6), 12.48 (1H, OH-5). ^{13}C ЯМР спектри (150 МГц, DMSO, δ, м.у): 160.02(C-2), 135.68 (C-3), 176.79 (C-4), 160.68 (C-5), 98.13 (C-6), 163.85 (C-7), 93.30 (C-8), 156.10 (C-9), 102.96 (C-10), 121.90 (C-1'), 115.55 (C-2'), 145.02 (C-3'), 146.76 (C-4'), 115.02 (C-5'), 119.92 (C-6') [9].



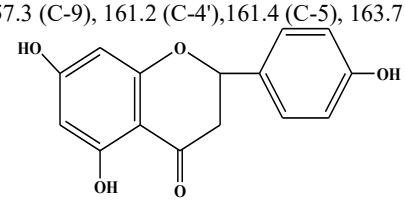
Lyuteolin sariq rangli kristall, $C_{15}H_{10}O_6$, R_f 0,58 (3-sistema, 73-бетга қаранг), Suyuq.x. 328-330^{0}C, UB-spektr (MeOH, λ_{max}, нм): 253, 265, 347 (CH_3COONa, $\lambda_{max,}$ нм): 270, 380, (CH_3COONa +H_3BO_3, $\lambda_{max,}$ нм): 263, 278, ($AlCl_3$, $\lambda_{max,}$ нм): 332, 430. IQ-spektr (KBr, ν, см$^{-1}$)- 3595, 3400 (OH), 1660 (>C=O), 1605, 1575, 1510 (aromatik halqa).^{1}H ЯМР (DMSO, м.у J/Гц 7.42 (1H, дд, J=2.4; 8.4, 6‘), 7.39 (1H, д, J=2.4, H-2’), 6.89 (1H, д, J=8.4, H-5‘), 6.67 (1H, с, H-3), 6.44 (1H,д, J=2.4, H-6), 6.18 (1H, д, J=2.4, H-8), 9.47 (1H, кенгайган с, OH-3‘), 9.92 (1H, кенгайган с, OH-4‘), 10.91 (1H, кенгайган с, OH-7), 13.00 (1H, с, OH-5).^{13}C ЯМР: 164.09 (C-2), 102.85 (C-3), 181.62 (C-4), 161.45 (C-5), 98.80 (C-6), 163.86 (C-7), 93.81 (C-8), 157.26 (C-9), 103.68 (C-10), 121.48 (C-1’), 113.35 (C-2’), 145.71 (C-3’), 149.67 (C-4’), 115.99 (C-5’), 118.96 (C-6’) [10].



Rutin-sariq rangli kristall, R_f 0,45 (3-sistema, 73-бетга қаранг), Suyuq.x.190-192^{0}C, $[\alpha]^{20}_D$=-20^0 (c 0.2; EtOH), UB (EtOH, λ_{max}, nm)-spektr: 256, 264, 355 (CH_3COONa, $\lambda_{max,}$ nm): 391, 273 (CH_3COONa+H_3BO_3, $\lambda_{max,}$ nm): 270, 362 ($AlCl_3$, $\lambda_{max,}$ nm): 416, 276. IQ-spektr (KBr, ν, sm^{-1}): 3595, 3400 (OH), 1660 (>C=O), 1605, 1575, 1510 (aromatik halqa), 1085, 1062, 1025, 980, 900 (qand qism).



Apigenin- $C_{15}H_{10}O_5$, Tsuyuq.346-348 ^{0}C (parchalan.), UB-spektr (λ_{max}, EtOH, nm): 270, 340; ^{1}H YaMR-spektr (400 MGts, δ, m.u., C_5D_5N): 6.62 (1H, d, J=2.0 GTs, H-6), 6.71(1H, d, J=2.0 Gts H-8), 6.80 (1H, s, H-3), 7.09 (2H, d, J=9.0 Gts, H-3', 5'), 7.84 (2H, d, J=9.0 Gts, H-2', 6'), 13.68 (1H, s, 5-OH). ^{13}C YaMR-spekrt (100 MGts, DMSO-d_6, δ, m.u.): 93.9 (C-8), 98.8 (C-6), 102.8 (C-3), 103.7 (C-10), 115.9 (C-3',5'), 121.1 (C-1'), 128.5 (C-2',6'), 157.3 (C-9), 161.2 (C-4'),161.4 (C-5), 163.7 (C-7), 164.1 (C-2), 181.7 (C-4).



Sinarozid (lyuteolin-7-O-β-D- glyukopiranozid) $C_{21}H_{20}O_{11}$, Mm 448, T suyuq. 240-242 ^{0}C. $[\alpha]^{20}_D$=-27.6 (piridin). UB-spektr (λ_{max}, EtOH, nm): 348, 260, IQ-spektr (ν_{max}, KBr, sm^{-1}): 3450-3200 (OH), 1658 (C=O γ-piron), (1612). ^{1}H-NMR (600 MHz, CD_3COCD_3 + D_2O, m.u.): δ 3.42 (1H, t, J = 9.0 Hz, H-4′), 3.49 (1H, t, J = 9.0 Hz, H-2″), 3.56 (1H, t, J = 9.0 Hz, H-3″), 3.60 (1H, m, H-5″), 3.68 (1H, dd, J = 12.2, 5.6 Hz, H-6a″), 3.85 (1H, dd, J = 12.2, 1.8 Hz, H-6b″), 5.10 (1H, d, J = 7.8 Hz, H-1″), 6.44 (1H, d, J = 1.8 Hz, H-6), 6.63 (1H, s, H-3), 6.83 (1H, d, J = 1.8 Hz, H-8), 6.95 (1H, d, J = 8.0 Hz, H-5′), 7.41 (1H, d, J = 8.0 Hz, H-6′), 7.43 (1H, s, H-2′). ^{13}C-NMR (125 MHz, CD_3COCD_3 + D_2O, m.u.): δ 61.7 (C-6″), 70.3 (C-4″), 73.8 (C-2″), 76.8 (C-3″), 77.4 (C-5″), 95.8 (C-8), 100.5 (C-6), 100.7 (C-1″), 103.7 (C-3), 106.3 (C-10), 113.8 (C-2″), 116.5 (C-5′), 120.3 (C-6′), 122.6 (C-1′), 146.3(C-3′), 150.4 (C-4′), 158.0 (C-9), 161.8 (C-5), 163.9 (C-7), 165.8(C-2), 183.1 (C-4)

Digidrokversetin (taksifolin)- $C_{15}H_{12}O_7$, Mm 304, UB-spektr (λ_{max}, EtOH, nm): 286, 398, IQ-spektr (KBr, ν, sm^{-1}): 3437, 3395 (OH),, 1611 (C=C), 1605, 1602, 1596 (C-OH), 1369, 1364 (CH_2), 1272, 1268 (C-C), 1249, 1210 (C=O), 1020 (C-CH), 854, 809 (C-C-O-).

Xulosa va takliflar: YSSX natijalari shundan dalolat beradiki, Diospyros kaki barglari tarkibida rutin ko‘p miqdorda mavjud, shuningdek, apigenin va digidrokversetin flavonoidlari ham etarli darajada uchrashi kelajakda xurmo barglari asosuda dori vositalari va BFQ yaratish istiqbollarini ochib beradi.

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