



“DORIVOR O‘SIMLIKLARNI YETISHTIRISH VA ULARDAN FOYDALANISHNING DOLZARB MASALALARI” MAVZUSIDAGI O‘ZBEKISTON - XITOIY XALQARO SIMPOZIUMI MATERIALLARI TO‘PLAMI



18-19-iyun 2026, Toshkent

<https://doi.org/10.5281/zenodo.21356314>



PROCEEDINGS OF UZBEKISTAN-CHINA INTERNATIONAL SYMPOSIUM ON "CURRENT ISSUES IN THE CULTIVATION AND UTILIZATION OF MEDICINAL PLANTS"



Tashkent, June 18–19, 2026

<https://doi.org/10.5281/zenodo.21356314>

Session 2.
Phytochemistry,
Biotransformation, and

Advanced Processing of Medicinal Plant Raw Materials

DEVELOPMENT AND VALIDATION OF METHOD TO QUANTIFY PIPERINE IN BLACK PEPPER SEED

Anam Saleem¹, Abdul Rahman Khan¹, Nizamul Haque², Abbas Ali Mahdi³,
Wahajul Haq^{1,4}, Jamal Akhtar Ansari^{1,4}

^{1,4}Department of Chemistry, Integral University Lucknow-226026, Uttar Pradesh,
India

²Department of Pharmacology, State Takmeel-Ut-Tib College and Hospital
Lucknow-226002, Uttar Pradesh, India

³Department of Chemistry Era University Lucknow-226003, Uttar Pradesh, India

⁴Central Instrumentation Facility (CIF), Integral Centre of Excellence for
Interdisciplinary Research (ICEIR), Integral University Lucknow-226026, Uttar Pradesh,
India

*Corresponding Author: jamalakhtar@iul.ac.in

Place of study: Department of Chemistry, Central Instrumentation Facility (CIF),
Integral Centre of Excellence for Interdisciplinary Research (ICEIR), Integral University
Lucknow-226026, Uttar Pradesh, India

Abstract. This study describes the development and validation of a rapid, highly sensitive and selective liquid chromatography-tandem mass spectrometry (LC-MS/MS) method for the precise isolation and quantification of piperine from black pepper (*Piper nigrum* L.) seeds. The extraction process was optimized by subjecting 10g of finely

	farmakognostik xususiyatlari hamda amaliy ahamiyati	
82.	Rejamurodova L., Yo'ldasheva N. Farmakologiyaning dolzarb masalalari	
83.	Xodjayeva N.J., Nurniyoziv A.A., Nurmuxammadov A. Farmakologiya, tibbiyot va oziq-ovqat sanoatida limon (<i>Citrus limon L.</i>)dan foydalanish	
84.	Aminova M.N. Farmakologiya, tibbiyot va oziq-ovqat sanoatida dorivor o'simliklardan foydalanishning dolzarb masalalari (Rovoch misolida)	
85.	Shomuratova S.N., Yuldasheva N.K., Nishanbayev S.Z. Fabaceae oilasiga mansub ayrim o'simliklar tarkibidagi tokoferollarning miqdorini uhp lc usulida aniqlash	
86.	Eshpulatov S.E., Sattarov A.S., Tursunmuratov Sh.Sh. Evaluation of the biosynthesis of secondary metabolites (iridoid glycosides or flavonoids) in <i>Plantago major l. Leaves growing in vitro</i> conditions	
87.	Mamarajabov D.M., Mirzaqulov X.Ch., Yorbobayev R.Ch. Dunyo miqyosida magniy qotishmalarining ishlatilish sohalari.	
88.	Xolov J.I., Safarov T.T. Dorivor yalpiz o'simligining ekologik talablari va dorivorlik xususiyatlari	
89.	Tuxtaboyeva F.M., Sulaymonova N. Dorivor qoqio't (<i>Taraxacum officinale L.</i>) o'simligining biologik faol moddalari	
90.	Umurkulova F.S., Abdusamatova M.A. Dorivor o'simliklar ekstraktleri va sut kislotasi bakteriyalarning sinergik ta'sirini o'rganish	
91.	Umurkulova F.S., Abdusamatova M.A. Dorivor o'simliklar asosida olingan biofaol birikmalarning probiotik mikroorganizmlar o'sishiga ta'sirini o'rganish	
Session 2. Phytochemistry, Biotransformation, and Advanced Processing of Medicinal Plant Raw Materials		
92.	Anam Saleem., Abdul Rahman Khan., Nizamul Haque., Abbas Ali Mahdi., Wahajul Haq., Jamal Akhtar Ansari. Development and validation of method to quantify piperine in black pepper seed.	
93.	Mohd Faiyyaz., Iqbal Azad., Abdul Rahman khan. Isatin-derived compounds containing anticancer therapeutics	
94.	Mantash Mirza., Wahajul Haq., Abdul Rahman Khan., Khujamshukurov N.A., Jamal Akhtar Ansari. Natural product inspired novel flavones: multi-target agents for complex diseases.	
95.	Normatov A.M., Niyozov X.N., Mamatqulova M.M. Anor urug'i yog'ining fitokimyoviy tarkibi va biologik faol komponentlarini GC-FID usulida tadqiq etish	
96.	Rahmonova M.D., Otajonov A.Sh., Nazarov G'.A. Dorivor gulxayri (<i>Althaea officinalis</i>) o'simligi fitokimyosi, biotransformatsiyasi va xomashyosidan shifobaxsh damlama tayyorlash	
97.	Baxtiyorova X.M., Normatov A.M. Kovul (<i>Capparis Spinosa L</i>) o'simligi mevasining kimyoviy tarkibi va tibbiyotda qo'llanilishi.	

98.	Faxriddinova D.J., Nurmuxamedova V.Z., Isaqova Sh.X. Soyadan olingan mahsulotlarning antimikrob faolligini o'rganish.	
99.	Duskobilova M.S. <i>Origanum vulgare l.</i> o'simligi tarkibidagi fenolik birikmalar va flavonoidlarning biokimyoviy hamda biologik faolligi	
100.	Zakirova M., Gulmatova Sh., Karimov H. Dorivor o'simlik <i>Glycyrrhiza glabra</i> ildizi ekstraktlarining mikrobiologik faolligini tadqiq qilish.	
101.	Jo'rayev R.N., Nazarov G'.A. <i>Maclura pomifera</i> mevasi tarkibidagi biologik faol qo'shimchani ajratib olish	
102.	Serkaboyeva M., Otajonov A.Sh., Maxmudova M.M. Sholi (<i>Oryza sativa</i>) qipig'idan biologik faol moddalar (steroidlar) ajratib olish usullari	
103.	Shahbaz Israr., Ali Ghazanfer. Phytochemicals in the Fight Against Antimicrobial Resistance: Mechanisms, Clinical Potential, and Future Perspectives.	
104.	Narzullayeva G.O., Niyozov X.N., Nazarov G'.A. Zanjabil ildiz mevasidan zingeron tabiiy fenol birikma ajratib olish hamda xalq tabobatida ahamiyati.	
105.	Zahid Ali., Sabin Saurav Pokharel., Khujamshukurov N.A., Fajun Chen. Effects of Foliar Spraying of SA and GA on Growth, Development, Reproduction and Population Dynamics of Semiaphis heraclei Fed on Cnidium monnieri and Daucus carota.	
106.	Mohd Akil., Iqbal Azad., Abdul Rahman Khan., Naseem Ahmad. Synthesis and in silico Analysis of 4,5-dihydro-1H-pyrazole derivative	
107.	Bakeyev R., Qo'shiyev H.H. <i>Lagochilus inebrians bunge</i> ning dorivor xususiyatlari va in vitro mikroklonal ko'paytirish istiqbollari.	
108.	Sanoyev A.I., Zaripova S.A., Xalilov R.M., Sadikov A.Z., Sagdullayev Sh.Sh. <i>Glycyrrhiza glabra l.</i> shrotidan glabridin va flavonoidlarni ajratib olishda turli ekstraksiya usullarini qiyosiy o'rganish	
109.	Курбанова Э.Р., Пирмухамедова С.А., Агзамова М.А. Влияние предпосевной обработки семян циклоартановыми гликозидами на всхожесть и рост хлопчатника.	
110.	Оманова U.M., Agzamova M.A. <i>Oxytropis macrodonta</i> ning yer ustki qismidagi pinitol.	
111.	Абдуллаева А.М., Кодиралиева Ф.А., Сиддикова А.А., Маликова М.Х. Полисахариды трёх видов растений рода <i>Salvia</i> .	
112.	Xushvaqtov J.G'. Abu jahl tarvuzi (<i>Citrullus colocynthis</i>)ning shifobaxsh xususiyatlari va undan foydalanish istiqbollari	
113.	To'lakov N.Q., Azimova D.U., Golden delicious olma navi po'stlog'idagi fenolli birikmalarning miqdoriy tahlili	
114.	Raximov D.P., Xu Jing., Wei Tao., Calvo Gomes Octavio., Abduraximov A.A. Ot yog'ini nanoemulsiyalar olishda qo'llashdan oldin uning tarkibini identifikatsiyalash, fizik-kimyoviy tahlil qilish	

27. Su W, Ouyang F, Li Z, et al., 2023. *Cnidium monnieri* (L.) Cusson Flower as a Supplementary Food Promoting the Development and Reproduction of Ladybeetles *Harmonia axyridis* (Pallas) (Coleoptera: Coccinellidae). *Plants*, 12 (9): 1786.
28. Sun Y, Yang A W H, Lenon G B, 2020. Phytochemistry, Ethnopharmacology, Pharmacokinetics and Toxicology of *Cnidium monnieri* (L.) Cusson. *International Journal of Molecular Sciences*, 21 (3): 1006
29. Tian H, Xu L, Li X, et al., 2025. Salicylic Acid: The Roles in Plant Immunity and Crosstalk with Other Hormones. *Journal of Integrative Plant Biology*, 67 (3): 773–785
30. Ullah C, Chen Y-H, Ortega M A, et al., 2023. The Diversity of Salicylic Acid Biosynthesis and Defense Signaling in Plants: Knowledge Gaps and Future Opportunities. *Current Opinion in Plant Biology*, 72: 102349.
31. Wari D, Abe J, Kitamura T, 2025. Native Japanese Polygonaceae Species as Potential Native Insectary Plants in Conserving Indigenous Natural Enemies. *Insects*, 16 (2): 232.
32. Wu X, Gao X, Zhu X, et al., 2019. Fingerprint Analysis of *Cnidium monnieri* (L.) Cusson by High-Speed Counter-Current Chromatography. *Molecules*, 24 (24): 4496.
33. Xu T, Yin J, Dai X, et al., 2024. *Cnidii fructus*: A Traditional Chinese Medicine Herb and Source of Antiosteoporotic Drugs. *Phytomedicine*, 128: 155375
34. Yang H, Li Q, 2023a. Simultaneous Determination of the Content of Isoimperatorin, Imperatorin, Oxypeucedanin, Xanthotoxol and Byakangelicin in *Angelica Dahurica* by HPTLC Scanning. *Journal of Chromatographic Science*, 61 (8): 717–724
35. Yang L, Luo S, Jiao J, et al., 2023b. Integrated Transcriptomic and Metabolomic Analysis Reveals the Mechanism of Gibberellic Acid Regulates the Growth and Flavonoid Synthesis in *Phellodendron Chinense* Schneid Seedlings. *International Journal of Molecular Sciences*, 24 (22): 16045
36. Zaynab M, Khan J, Al-Yahyai R, et al., 2024. Toxicity of Coumarins in Plant Defense against Pathogens. *Toxicon*, 250: 108118
37. Zhang Y, Bai P, Zhuang Y, et al., 2022. Two O-Methyltransferases Mediate Multiple Methylation Steps in the Biosynthesis of Coumarins in *Cnidium monnieri*. *Journal of Natural Products*, 85 (8): 2116–2121
38. Zhang X, Ouyang F, Su J, et al., 2022b. Intercropping Flowering Plants Facilitate Conservation, Movement and Biocontrol Performance of Predators in Insecticide-Free Apple Orchard. *Agriculture, Ecosystems & Environment*, 340: 108157

SYNTHESIS AND IN SILICO ANALYSIS OF 4,5-DIHYDRO-1H-PYRAZOLE DERIVATIVE

Mohd Akil¹, Iqbal Azad^{1*}, Abdul Rahman Khan¹, Naseem Ahmad^{1*}

¹*Department of Chemistry, Integral University, Lucknow – 226026*

*Corresponding Author: Iqbal Azad (iazad@iul.ac.in) Naseem Ahmad
(naseem@iul.ac.in)

Abstract. The present work reports the synthesis of novel chalcone-derived compounds obtained *via* simple condensation of chalcone derivatives with phenyl hydrazine. Their design, preparation, and biological assessment are described in detail. Structural elucidation was confirmed by FTIR, ¹H NMR, ¹³C NMR, and HRMS analyses. *In-silico* ADMET profiling, carried out using AdmetLab 3.0 and SwissADME, indicated favorable pharmacokinetic and toxicity parameters, closely resembling those of reference agents Amphotericin B and Ciprofloxacin. These findings underscore the promise of chalcone scaffolds as versatile templates for antibacterial drug development.

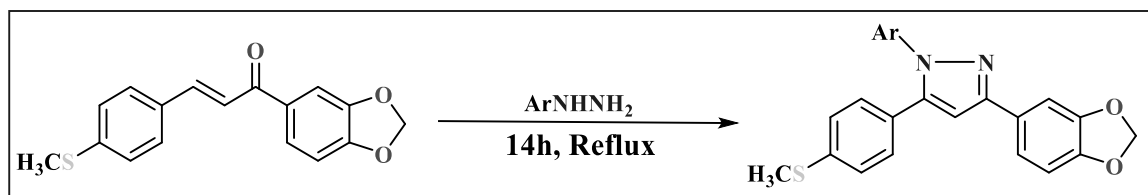
Keywords: Synthesis; Heterocycles; *In silico*; ADMET; Pyrazole

Introduction. Heterocyclic compounds, defined by ring systems containing heteroatoms such as nitrogen or sulfur, represent one of the most important classes of organic molecules [1]. Their prevalence is striking, with estimates suggesting that more than 85% of organic compounds incorporate heterocyclic motifs [2]. Nitrogen-containing heterocycles, including quinolines, indoles, and pyrroles, are widely studied for their pharmacological relevance [2–3]. Similarly, sulfur-based heterocycles account for a significant proportion of FDA-approved drugs and exhibit diverse biological activities, ranging from antibacterial and antifungal to anticancer and antiviral effects [4–8]. Given their broad therapeutic potential, the synthesis of novel heterocyclic derivatives remains a central focus in organic chemistry. Chalcone scaffolds, in particular, provide versatile templates for constructing heterocyclic frameworks with promising biological activity [9–12]. In the present study, new chalcone-based derivatives were synthesized via a simple condensation approach, and their structures were confirmed by FTIR, ^1H NMR, ^{13}C NMR, and HRMS. To complement the synthesis, *in silico* ADMET profiling was performed using AdmetLab 3.0 and SwissADME, which revealed favorable pharmacokinetic and toxicity characteristics comparable to those of the standard drugs Amphotericin B and Ciprofloxacin. These findings underscore the potential of chalcone-derived heterocycles as candidates for antibacterial drug development.

Materials and Methods. All chemicals and solvents employed in the synthesis were procured from Sigma-Aldrich and used without further purification. The progress of reactions was monitored by thin-layer chromatography (TLC). Purification of the synthesized derivatives was achieved through column chromatography to obtain analytically pure compounds. Structural characterization was performed using FTIR, ^1H NMR, ^{13}C NMR, and HRMS, confirming the identity and purity of the products.

General synthesis 3-(benzo[d][1,3]dioxol-5-yl)-5-(4-(methylthio)phenyl)-1-phenyl-1H-pyrazole

Chalcone derivative (0.5 mmol) was taken and reacted with phenyl-hydrazine (1 mmol) for about ~12 hours under reflux at about 50°C . After this period, a precipitate formed in the RB flask, which was then filtered and collected.



Scheme 1. General synthesis of 3-(benzo[d][1,3]dioxol-5-yl)-5-(4-(methylthio)phenyl)-1-phenyl-1H-pyrazole

Conclusion. This study reports the successful synthesis and structural characterization of 3-(benzo[d][1,3]dioxol-5-yl)-5-(4-(methylthio)phenyl)-1-phenyl-1H-pyrazole. Their *in silico* ADMET and toxicity analyses exhibited favorable pharmacokinetic properties and

minimal predicted toxicity. These results support further refinement of chalcone scaffolds and justify subsequent *in-vitro* validation to establish their therapeutic relevance.

References

- [1]. Qadir, T., Amin, A., Sharma, P. K., Jeelani, I., & Abe, H. (2022). A review on medicinally important heterocyclic compounds. *The Open Medicinal Chemistry Journal*, 16(1).
- [2]. Patnayak, S. (2024). Heterocyclic Compounds An Potential Drug And Its Biological Activity: A Review. *Journal of Nonlinear Analysis and Optimization*, 15(1).
- [3]. Ebenezer, O., Jordaan, M. A., Carena, G., Bono, T., Shapi, M., & Tuszyński, J. A. (2022). An overview of the biological evaluation of selected nitrogen-containing heterocycle medicinal chemistry compounds. *International Journal of Molecular Sciences*, 23(15), 8117.
- [4]. Tran, T. N., & Henary, M. (2022). Synthesis and applications of nitrogen-containing heterocycles as antiviral agents. *Molecules*, 27(9), 2700.
- [5]. Mustafa, M., & Winum, J. Y. (2022). The importance of sulfur-containing motifs in drug design and discovery. *Expert opinion on drug discovery*, 17(5), 501-512.
- [6]. Aksoz, B. E. (2021). Chalcones as Anti-inflammatory, Anti-diabetic, and Anti-depressant Agents. In *Frontiers in Natural Product Chemistry: Volume 7* (pp. 197-246). Bentham Science Publishers.
- [7]. Wang, S., Li, C., Zhang, L., Sun, B., Cui, Y., & Sang, F. (2023). Isolation and biological activity of natural chalcones based on antibacterial mechanism classification. *Bioorganic & Medicinal Chemistry*, 93, 117454.
- [8]. de Oliveira, A. S., Cenci, A. R., Gonçalves, L., Thedy, M. E. C., Justino, A., Braga, A. L., & Meier, L. (2024). Chalcone derivatives as antibacterial agents: An updated overview. *Current Medicinal Chemistry*, 31(17), 2314-2329.
- [9]. Ali, S. N., Yadav, Khan, M. A., Khan, A. R. & Hassan, F. (2025). A Report On Chalcone Derivatives: Anticancer Effect In Drug Developments. *African Journal of Biomedical Research*, 28(2S), 245-298. <https://doi.org/10.53555/AJBR.v28i2S.6795>
- [10]. Constantinescu, T., & Lungu, C. N. (2021). Anticancer activity of natural and synthetic chalcones. *International journal of molecular sciences*, 22(21), 11306.
- [11]. Kumar, V., Dhawan, S., Girase, P. S., Awolade, P., Shinde, S. R., Karpoomath, R., & Singh, P. (2021). Recent advances in chalcone-based anticancer heterocycles: A structural and molecular target perspective. *Current Medicinal Chemistry*, 28(33), 6805-6845.
- [12]. Nematollahi, M. H., Mehrabani, M., Hozhabri, Y., Mirtajaddini, M., & Iravani, S. (2023). Antiviral and antimicrobial applications of chalcones and their derivatives: From nature to greener synthesis. *Heliyon*, 9(10).

LAGOCHILUS INEBRIANS BUNGE NING DORIVOR XUSUSIYATLARI VA IN VITRO MIKROKLONAL KO'PAYTIRISH ISTIQBOLLARI

***Bakeyev R., Qo'shiyev H.H.**

Guliston davlat universiteti Agrobiotexnologiyalar va Biokimyo Ilmiy Tadqiqot Instituti

***Mas'ul muallif:** refatbakeev3@gmail.com