

---

# The Potential Production Of Aromatic Compounds In Flowers

Thank you unconditionally much for downloading The Potential Production Of Aromatic Compounds In Flowers. Maybe you have knowledge that, people have look numerous times for their favorite books considering this The Potential Production Of Aromatic Compounds In Flowers, but stop in the works in harmful downloads.

Rather than enjoying a fine book later a cup of coffee in the afternoon, otherwise they juggled when some harmful virus inside their computer. The Potential Production Of Aromatic Compounds In Flowers is to hand in our digital library an online permission to it is set as public appropriately you can download it instantly. Our digital library saves in complex countries, allowing you to acquire the most less latency times to download any of our books with this one. Merely said, the The Potential Production Of Aromatic Compounds In Flowers is universally compatible like any devices to read.



---

Engineering Aminotransferases for the Biocatalytic Production of Aromatic D-Amino Acids Springer Science & Business Media  
This book deals with the sources, distribution, analytical methods, and monitoring of Polycyclic aromatic hydrocarbons (PAH) in the occupational environment. It is hoped that this book will make a contribution to understanding the formation and determination of PAH in work atmosphere and that it will make a particular contribution to occupational health projects. Much of the information given in this book has been generating in studies carried out in cooperation with the

Norwegian aluminium industry.  
New Vistas in Agroforestry Allied Publishers  
Dear Academicians, Readers and Educators, We are pleased to present the issue of the International Journal of Secondary Metabolite as a special issue entitled ' I. International Congress on Medicinal and Aromatic Plants - " Natural And Healthy Life " ' . This special issue contains some of scientific studies presented in the congress. Hosting the I. International Medical and Aromatic Plant Congress, held in Konya on 9-12 May 2017, by the cooperation T.R. Ministry of Forestry and Water Affairs, General Directorate of Forestry and Necmettin Erbakan University was a great honor for us. The total number of abstract submission for the congress was 1923. After the scientific evaluation, 85 abstracts were rejected and 244 abstracts were withdrawn. As a result, a total of 1594 abstracts were accepted for presentation: 280 of them as oral presentation and 1314 as poster presentation. 2604 authors were contributed and

---

1543 participants were participated to the congress. The studies presented in the congress was electronically shared in terms of accessibility. The authors of 220 papers, presented in the congress, submitted to the International Journal of Secondary Metabolite for publication. 70 of them were published and 150 full papers were rejected due to revision deadline, reviewing process etc. after reviewing process. I would like to special thank to the Journal founder for publishing and also to the editor, editorial board and authors for contributing this issue. Best regards. Dr. Muzaffer EKER Rector of Necmettin Erbakan University TC Orman ve Su leri Bakanl ı , Orman Genel M ü d ü r l ü ü ve Necmettin Erbakan Ü niversitesi payda l ı l ı nda, Necmettin Erbakan Ü niversitesi ev sahipli ğ inde 9-12 May ı s 2017 tarihlerinde Konya ' da ger ç ekle tirilen I. Uluslararası T ı bbi ve Aromatik Bitkiler Kongresi ' nin a ç ı l ı l ı program ı , Orman ve Su leri Bakanl ı

Say ı n Prof. Dr. Veysel Ero lu, Sa l ı k Bakan ı Prof. Dr. Recep Akda , Milletvekilleri, Konya Valisi Yakup Canbolat, Konya B ü y ü k Ő hir Belediye Ba kan ı Tahir Aky ü rek, Afyon Kocatepe Ü niversitesi Rekt ö r ü Prof. Dr. Mustafa Solak, Necmettin Erbakan Ü niversitesi Rekt ö r ü Prof. Dr. Muzaffer eker, Orman Genel M ü d ü r ü , Dekanlar, Akademisyenler, Daire Ba kanlar ı , ö renciler ve sekt ö rde faaliyet g ö steren i adamlar ı n ı n kat ı l ı m ı yla ger ç ekle tirilmi tir. Kongre, son y ı llarda yap ı lan en geni kat ı l ı ml ı bilimsel organizasyon olma ö zelli ğ i ta ı maktad ı r. Kongreye t ı bbi ve aromatik bitkilerin dahil oldu u pek ç ok alandan tan ı nm ı ve se ç kin akademisyenler kat ı lm ı t ı r. Davetli Konu mac ı olarak kongreye kat ı lan Mauritius Ü niversitesi ' nden Vidushi Neergheen-Bhujun, Handong Global Ü niversitesi ' nden Jong Bae Kim, Malezya ' dan ve Ege Ü niversitesi ' nden emekli Prof. Dr. M ü nir Ö z t ü rk, Yeditepe

---

Üniversitesi 'nden Prof. Dr. Erdem Ye ilada, Sebahattin Zaim Üniversitesi 'nden Prof. Dr. Adem ELGÜN, TÜB TAK Marmara Ara tırma Merkezi 'nden Prof. Dr. Cesarettin Ala alvar, Hacettepe Üniversitesi 'nden Prof. Dr. rem Tatlı Çankaya ve Cumhuriyet Kanı ba danı manı Prof. Dr. brahim Adnan Sara ço lu bunlar aras ında say ılabilir. Kongrede ü ç g ün boyunca yedi ayrı salonda a a ı daki ba lı klar alt ında sö z l ü ve poster bildiriler sunulmu ve yo un kat ılı m gö z lenmi tir. T ı bbi Bitki, Aromatik Bitki ve Mantar Ü retimi T ı bbi ve Aromatik Bitkisel Ü r ü n Sanayii Fonksiyonel G ı dalar, Bitkisel Ç ayılar ve Nutras ö tikler Tabii Kozmetik Ü r ü nler Aromatik Bitkiler ve U ç ucu Ya lar Farmakoloji, Farmakognozi (Toksikoloji, Farmakovijilans) Tabii Bitki Ö rt ü s ü n ü n Korunması ve Etnobotanik T ı bbi ve Aromatik Bitkilerde Antropoloji, Sosyo-Ekonomi, K ü lt ü r ve Etik T ı bbi ve Aromatik Bitkilerin

Ak ı lc ı Kullan ı m ı Kongrede sö z l ü sunular Lokman Hekim, Farabi, bn-i Sina, Ak emsettin, Mevl â na ve Balo Salonları nda, poster sunular ise Poster Salonunda ger ç ekle tirilmi tir. Kongre s ü resince; Selva Redoks, Tales Analitik, Dr. Mustafa M ü cahit Y ı lmaz, Sem, Yap ı lcan, Biosan firmaları ile Orman Su leri Bakanlı ı , Konya B ü y ü k ehir Belediyesi Park ve Bah ç eler Daire Ba kanlı ı , NE Ü G ı da M ü hendisli i B ö l ü m ü , NE Ü Sa lı k Bilimleri Fak ü ltesine ait stantlarda t ı bbi ve aromatik bitkilerle ilgili ü r ü n ve yay ın tan ıt ı mları ger ç ekle tirilmi tir. Orman Genel M ü d ü r l ü ü kongreye ö d ü ll ü foto raflar sergisi ile renk katm ı t ı r. Kongremizin d ü zenlenmesinde 12 Y ü r ü tme Kurulu, 24 yerli 25 yabanc ı olmak ü zere 49 Bilim Kurulu ve 11 Dan ı ma Kurulu ü yesi görev yapm ı t ı r. Kongremize toplam 1543 kat ılı mc ı ba vurmu olup, kat ılı mc ı lar i ç erisinde 520 ö retim elemanı , 483

---

ö retim ü yesi, 429 ö renci ve 111 sekt ö r temsilcisi/dinleyici yer alm ı t ı r. Kongremize 524 bay kat ı l ı mc ı , 1019 bayan kat ı l ı mc ı ba vurmu tur. Kongreye bildiri g ö nderen 2604 yazardan; 382 adeti ziraat, 321 adeti g ı da, 311 adeti orman, 270 adeti m ü hendislik, 225 adeti sa l ı k, 161 adeti diyetisyenlik, 157 adeti veterinerlik, 145 adeti farmakoloji, 104 adeti eczac ı l ı k, 37 adeti di hekimli i ve 491 adeti kozmetik, peyzaj, sosyal, k ü lt ü rel vb. di er alanlarda ç al ı t ı ı belirlenmi tir. Kongreye toplam bildiri ba vurusu 1923 adet olup, bilimsel de erlendirme sonucu 85 adeti reddedilmi , 244 adet bildiri geri ç ekilmi tir. Sonu ç olarak 280 bildiri s ö z l ü bildiri olarak ve 1314 bildiri poster bildiri olmak ü zere toplam 1594 bildiri kabul edilmi tir. S ö z l ü bildiriler konular ı na uygun olarak 48 oturumda, poster bildiriler ise 14 oturumda sunulmu lard ı r. Bu bildiriler i ç erisinde yazarlar taraf ı ndan bildiri kitab ı nda bas ı lmak ü zere 159 tam metin

g ö nderimi ger ç ekle tirilmi , ayn ı zamanda uluslararası alan indeksli International Journal of Secondary Metabolite dergisine de 173 tam metin makale g ö nderilmi olup toplam 332 adet tam metin haz ı rlanm ı t ı r. Kongre web sayfam ı za 45 bin tekil ziyaret ç i girmi ve 4 milyondan fazla hit olu turmu lard ı r. Kongre duyurular ı ve hat ı rlatmalar ı i ç in 150 binden fazla mail g ö nderilmi olup, yakla ı k 15 bin mail al ı nm ı t ı r. Kongre ile ilgili sekreteryaya ü zerinden yakla ı k 6000 g ö r ü me yap ı lm ı t ı r. Yukarda ifade edilen konferans, bildiri oturumlar ı ve toplant ı larda; t ı bbi ve aromatik bitkiler sekt ö r ü nde ortaya ç ı kan reform ihtiya ç lar ı , mevzuat, ula ı m ve kalite sorunlar ı vb. konular tart ı ı lm ı t ı r. Ortaya ç ı kan sonu ç lar, kongre d ü zenleme kurulu taraf ı ndan sonu ç bildirgesi haline getirilmi tir. Sonu ç Bildirgesi ile tam metin kongre kitab ı e-kongre kitap olarak kongre payda lar ı na ait web siteleri ile kongre web

---

sitesinden (www.tabkon.org) kamuoyu ile paylaşılacaktır. SONUÇ ve DEĞERLENDİRME RAPORU Kongrede değerlendirme oturumu soru-cevap kısmından elde edilen sonuçlar ile değerlendirmelerini gönderen bilim insanlarının görüşleri, aşağıda yer aldığı gibi özetlenebilir: 1- Bitkisel ürünlerin sağlıklı üzerine olumlu etkilerinin olduğu bilinmektedir. Ancak bu ürünlerin yanlış kullanımı nedeniyle karaciğer nakline kadar gidebilen hayati ve ciddi sağlık sorunlarına yol açabildiği görülmektedir. Sektörün ve vatandaşın sorunlarına yönelik çözüm üretmek amacıyla Bakanlıklar (Orman ve Su İşleri Bakanlığı, Sağlık Bakanlığı, Gıda, Tarım ve Hayvancılık Bakanlığı ve Gümrük ve Ticaret Bakanlığı) arasında bir TIBB VE AROMATİK BİTKİLER KOORDİNASYON ÜST KURULU oluşturulmalıdır. 2- Bölgemizin tıbbi ve

aromatik bitkiler sektöründe; ilk olarak bölgelere göre tıbbi-aromatik bitki üretimi planlama çalışmaları yapılmalıdır. Bölgelere göre ekonomik değeri ve üretimi potansiyeli yüksek bir veya birkaç bitki türü belirlenmelidir. Bu bitki türünün doğadan toplama ve kültürel olarak üretilebilecek türleri ayrı ayrı belirlenmelidir. Gerekli türünün belirlenmesi, üretim planlaması ve fiyatlandırma çalışmaları yapmak için yerelden; STK, kamu ve özel sektör uzmanlarının yer aldığı farklı disiplinlerden mütekkil bir komite kurulmalıdır. Bu belirlenen bitkilerin toplanması gerekirse kültürel olarak üretilmesi için gerekli organizasyonlar ve destekler sağlanmalıdır. 3- Ülkemiz çok zengin doğasına rağmen, halen lenmemi bir bitki ihracat çansı olmaya devam etmektedir. Ülkemizde bitkisel ilaç sanayinin gelişmesi, bunun yanında parfümeride kullanılan sentetik

---

ürünlerin daha ucuz olması gibi nedenlerle, doğal uçucu yağların ikinci planda kalması, tıbbi ve aromatik bitkilerin üretim olanaklarının kısıtlanmasıdır. 64- Tıbbi ve aromatik bitkilerin mevcut durumunu korumak ve artan pazarda yer almasını sağlamak için piyasanın istediği ürünleri istediği miktar ve kalitede sunmaması önemli bir sorundur. Doğal zenginliklerimizin sürdürülebilirliği ve gelecekteki araştırmaları için gen kaynaklarının korunması (insitu ve ex-situ) önemlidir. Ancak tıbbi ve aromatik bitki üretimini doğadan toplayarak karılamamamız önemli bir sorundur. Yeterli miktarda, standart ve kaliteli ürün üretmek için bu bitkilerin kültürel alınması ve ıslahı önemli bir sorundur. Tıbbi aromatik bitkilerde ülkemiz endemik bitkilerinin isimlendirilmesinde terminoloji birlikteliği ve bölgesel coğrafi farklılıklar tanımlayıcı temel bilgilerin netleştirilmesi gerekmektedir. Ayrıca ülkemiz florasına uygun çeşit

ıslahına yönelik proje çalışmaları yapılmamaktadır. (kültürel alma, adaptasyon, ıslah vb.) 5- Tıbbi ve aromatik bitkilere ait düzenli istatistiksel veriler bulunmamaktadır. Bu arz-talep ilişkisi dikkate alınarak üretim yapmayı zorlatılmaktadır. Bu nedenle bitkilerle ilgili bilgilerin toplanması ve ulaşılabilecek veri bankalarının oluşturulmasıdır. Yurtiçi ve yurtdışı ticareti yapılan doğal bitkilerin tam bir listesi, toplayıcı, aracı, ihrac eden firma ve ilgili devlet kurumlarıyla birlikte hazırlanması ve veri tabanının oluşturulmasıdır. Tıbbi ve aromatik bitkilerin doğadan toplanmalarını kontrol altına alınması, nesli tehlikede olanların koruma altına alınması, öncelikle tarımına geçilmeli, tüm bu bilgiler oluşturulacak veri tabanında yer almalıdır. 6- En çok ihracat yapılanlarındaki bitkisel ürünlerin ihracat istatistiklerinde "diğerleri" başlığında yer almaktadır. Bu yüzden

Ülkemizden ihraç edilen drogların tam bir listesine ulaşabilmek mümkün olmamaktadır. Bu bitkiler üzerinde sağlıklı çalışmalar yapılabilmesi için bunların ticaretlerinin izlenmesi, ihracat ve özelliğe göre üretim miktarlarının ve bunların ne kadarının doğadan toplama ve ne kadarının da tarla üretiminden geldiğinin istatistiklerde açık ve net olarak yer alması zorunluluğunda bulunmaktadır. 7- Tüketiciler ve sanayiciler taleplerine cevap veren kaliteli ve standart ürünlerin geliştirilmesi, uygun ekolojik koşulların belirlenmesi, doğal bitkilerin doğaya zarar vermeden zamanında toplanması, hasat sonrası işlemler ve işleme teknolojisinin belirlenmesi tıbbi ve aromatik bitkilerde üretim ve pazar olanaklarının arttıracaktır. Bölgelere göre, birkaç üründe özüt ve etken madde üretimine geçilmesi, üretilen ürünleri için markalaştırma ve standart oluşturma faaliyetlerinin

ürütülmesi elzemdir. Ayrıca ham madde üretimini ikincil ürünlerle dönüştürecek tarıma dayalı sanayi tesislerinin bölgeye kazandırılması oldukça önemlidir. 8- Gıda, Tarım ve Hayvancılık İl Müdürlüklerinin, fide ve tohum dağıtılması noktasında il özel idaresiyle birlikte projeler yapmasının birçok etkili olacaktır. 9- Tıbbi ve aromatik bitkiler alanında faaliyet gösteren üreticiler, toplayıcılar, ihracatçıları, sanayicileri, araştırmacıları ve diğer tüm paydaşlarının koordinasyonunu sağlayacak bir sistem ve araştırma sonuçlarının pratiğe aktarılması için, araştırmacılar, sanayiciler, üreticiler arasında bilgi akışının sağlayacak yayın sistemi oluşturulmalıdır. 10- Genetik kaynaklar kullanılarak tarıma ve ülke ekonomisine endemik, vb. ekonomik değeri olan bitkiler kazandırılmalıdır. Genetik materyal (tohumluk-fide) yetersizliğini gidermek için çalışmalar yapılmalıdır. 11-



---

Ta i (yabanc ı madde kar ı t ırma) problemine kar ı standardizasyon sa lanmal ı d ır. 12- Aktar d ü kkan ı a ç mak ı ç in T ı bbi ve Aromatik B ö l ü m mezunu olma art ı getirilmelidir. 13- ki y ı ll ık olan e itim s ü resi yetersizdir. Avrupa ü lkelerindeki gibi Medikal Herbalist ' lik ekinde uygulamal ı en az ü ç y ı ll ık e itim verilmelidir. 14- Hali haz ı rdaki m ü fredat g ö zden ge ç irilerek bu konudaki s ö z sahibi ü lkelerdeki gibi e itim verilmelidir. Okullar aras ı nda m ü fredat birli i sa lanmal ı d ır. E itimcilerin bu konuda yetkinli i art ko ulmal ı d ır. Meslek gereklerine uygun, donan ı ml ı mezunlar ı n yeti eabilmesi i ç in e itime uygun altyap ı sa lanmal ı d ır. 15- Bu b ö l ü m mezunlar ı na yeterli e itim verilerek " herbalist " ü nvan ı verilebilir. Ve yasalarca da tan ı nabilir. Mevcut unvan olan " T ı bbi ve Aromatik Bitkiler Teknikeri " uzun bir unvan oldu undan daha ak ı lda kal ı c ı bir unvan i ç in d ü zenleme

yap ı lmal ı d ır. 16- Baharat, bitkisel g ı da takviyesi, do al kozmetik, bitki ç ay ı , bitkisel ila ç ü reten i yerleri ile bu t ü r ü r ü nlerin sat ı ın ın yap ı ld ı ı eczane, aktar, organik ü r ü n d ü kk â nlar ı nda b ö l ü m mezunlar ı n ın ç al ı t ır ı lmas ı zorunlulu u yasalarca dikkate al ı nmal ı d ır. 17- Bilimsel ara t ırma sonu ç lar ı n ı n prati e aktar ı lmas ı noktas ı nda ç al ı malar ı n yap ı lmas ı gerekmektedir. Elde edilen sonu ç lar ı n ulusal ve uluslararası ö l ç ü de katkı yapmas ı beklenmektedir. 18- Ü lkemizde bitkisel ila ç sanayinin geli mesine y ö nelik ç al ı malara destek verilmelidir. 8 19- Uluslararası ticarete ö nem ta ı yan t ü rlerin ü retimi ve ihracat ı n ı n artt ır ı lmas ı gerekmektedir. 20- Pazar garantili bah ç e-tarla uygulamalar ı na y ö nelik ç al ı malar ile markala maya y ö nelik ç al ı malar yap ı lmal ı d ır. Ayr ı ca stratejik de eri olan ü r ü nlerin ü retimine gidilmelidir. 21- Herhangi

bir zaman diliminde pop ü ler olan t ü r ya da ü r ü n ü zerine yo unla mak yerine her d ö nem ö nemini kaybetmeyen t ü rlere ö nem verilmelidir. 22- T ı bbi ve aromatik bitkilerin tar ı m ı i  in orman arazileri yerine tar ı msal alanlar ı n ayr ı lmas ı gereklidir. 23- T ı bbi ve aromatik bitki analizi ile ilgili yetkin laboratuvarlar arac ı l ı l ı yla kriterler belirlenmeli (bile nlerin i  eri i ve miktar ı ) ve yap ı lacak  al ı malarda bu standartlar baz al ı nmal ı d ı r. 24- Bitkilerin do ru tan ı mlanmamas ı ö nemli bir hata olarak kar ı m ı za  ı kmaktadır. Bu konuda yetkinli i olan ki ilerle ortak  al ı m ı lmal ı d ı r. 25- Ü retim teknolojileri ile ilgili  al ı ma yapmak isteyen yat ı r ı mc ı lara gerekli e itimler bakanl ı k vb. kurumlar ı n deste iyle verilmelidir. 26- Fitoterapi konusunda Sa l ı k Bakanl ı ı ' n ı n deste i gereklidir. 27- G ı da takviyesi olarak sat ı lan ü r ü nlerin ruhsatland ı r ı lmas ı Sa l ı k Bakanl ı ı

taraf ı ndan yap ı lmal ı d ı r. 28- Bilimsel  al ı malara konu olan bitkiler aktar veya pazardan temin edilmemeli, do al ortam veya k ü lt ü r ortam ı ndan al ı nmal ı . Bu t ü r bildiriler bilimsel kongrede kabul edilmemelidir. 29- T ı bbi ve aromatik bitkilerin ü retimi esnas ı nda zirai m ü cadelede ruhsatl ı pestisit ü retimi ü zerine  al ı malar yap ı lmal ı d ı r. 30- Kongre esnas ı nda posterlerin okunabilmesi i  in daha uzun s ü re as ı l ı kalmal ı d ı r. lave olarak bu amaca d ö n ü k olarak posterler elektronik ortamda yay ı mlanmal ı d ı r. 31- Kongrede kullan ı lan dilin T ü rk  e ve ngilizce olmas ı ö nem arz etmektedir. 32- Etnobotanikte 70 farkl ı  e it bitkiye “ kekik ” ad ı veriliyor. Bunu giderecek  al ı malar yap ı lmal ı d ı r. 33- Sar ı ve k ı rm ı z ı kantaronun etki mekanizmalar ı farkl ı olmas ı na kar ı n, bu bitkiler kar ı t ı r ı larak hataen birbirinin yerine kullan ı labilmektedir. Bu y ü zden baz ı sa l ı k problemleri ya anabilmektedir. Bu ve benzeri

durumlar ın giderilmesi i in gerekli al ı malar yapı lmal ı d ır. 9 34- Lavanta vb. endemik bitkilerin ü lke ekonomisine kazandı r ı lması i in al ı malar yapı lmal ı d ır. 35- T ı bbi ve aromatik bitkiler ü zerine farklı bilim disiplinlerinin i birli i i inde y ü r ü tece i multidisipliner al ı malar ve toplant ı lar ın say ı s ı art ı r ı lmal ı d ır. Fakat bu toplant ı lar belli bir koordinasyon i inde y ü r ü t ü lmelidir. Benzer tarzda fazla say ı da yak ı n tarihli ve i erikli toplant ı lar d ü zenlenmektedir. 36- T ı bbi ve aromatik bitkilerle ilgili kongrelerin mutad olarak ulusal ve uluslararası bazda d ü zenlenmesi gerekir. Bunun i in 2 y ı lda bir ulusal 4 y ı lda bir uluslararası kongre d ü zenlenmesine karar verilmi tir. Ger ekle tirilecek kongrelerden  ı kacak sonu  ve ö neriler, akademik, ekonomik ve ü retim/ ü r ü n/faydal ı model/yeni teknolojiler  ı kt ı lar ın ın olması i in azami ö zen ve gayretin g ö sterilmesi b ü y ü k

ö neme haizdir. 37- Bir sonraki Ulusal T ı bbi ve Aromatik Bitkiler Kongresi ' nin Afyon Kocatepe Üniversitesi ev sahipli inde 2018-2019 e itim ö retim d ö neminde Afyon ' da yapı lması na karar verilmi tir. Kongre sonu  lar ın ın; ü lkemize, bilim insanları na, ü reticilere, sanayicilere ve b ü t ü n insanları a olumlu katkı yapması dile iyle...16.05.2017- Konya *Medicinal and Aromatic Plants of the World* Springer Science & Business Media  
Aromatic organic hydrocarbons and heterocycles represent a bulk of about one third of all industrially produced organic basic materials. Aromatic compounds such as benzene, phenol, naphthalene, anthracene, and their

---

homologues, are derived from raw materials, coal, crude oil and biogenic resources by thermal and catalytic refining processes. This book introduces the chemistry of aromatics with a brief discussion of the aromatic character and a survey of historical aspects, particularly the development of the organic dye industry during the 19th century. The main emphasis of the book is to give a clear prospect of industrial processes for the production and the derivatisation of aromatics

with consistent flow diagrams. Economical aspects of by- and side-products are especially regarded. For the most important aromatics an analysis of the international market included their derivatives: polymers, pesticides, dyes, pigments and drugs. Professional scientists, managers and students in chemistry and chemical engineering will find a wealth of information for their career and daily work.

**FDCA Production from Raw Sugar - Cost Analysis - FDCA E21B** New India Publishing

---

Future Sources of Organic Raw Materials: CHEMRAWN I is a collection of lectures presented at the World Conference on Future Sources of Organic Raw Materials, held in Toronto, Canada, on July 10-13, 1978. The conference focused on potential future sources of organic raw materials such as non-conventional fossil hydrocarbons, coal, industrial and agricultural wastes, and renewable resources like wood and other plant materials. This book is comprised of 52 chapters and opens with an assessment of the likely future availability of conventional oil and gas as they relate to possible demands for petrochemical feedstocks, paying particular attention to

the availability and demand patterns for fossil hydrocarbons. The following chapters discuss the reserves and worldwide distribution of oil shale and tar sands; climate and its impact on renewable resources; research and management of natural resources; and production of chemicals directly from synthesis gas. Pyrolysis of solid carbonaceous materials is also considered, along with natural rubber production and biomass for non-food use. This monograph will be a useful resource for organic chemists and energy policymakers.

**Medicinal and Aromatic Plants IV** Intratec Papers presented at the National Seminar on Conservation and Utilization of Medicinal and

---

Aromatic Plants, held at Bhubaneswar during 4-6 December 2001; in Indian context.

Journal of the Institute of Petroleum Frontiers Media SA

Aroma has played a vital role, directly as well as indirectly, in the life of human beings since its appearance on the earth as a result of evolution. India, Egypt and Persia were amongst the first countries to have conceived the process of distillation of essential oils. Aromatic plants have essential or aromatic oils naturally occurring in them. They help heal mental ailments and other diseases. India is endowed with a rich wealth of medicinal plants. Aromatic (Aroma Producing) plants are those plants which produce a certain type of aroma. Their aroma is due to the presence of some kind of essential oil with chemical constituents that contain at least one benzene ring in their chemical configuration. These plants have made a good contribution to the development of ancient Indian material medica. In recent years,

there has been a tremendous growth of interest in plant based drugs, pharmaceuticals, perfumery products, cosmetics and aroma compounds used in food flavors and fragrances and natural colors in the world. The chemical nature of these aromatic substances may be due to a variety of complex chemical compounds. There is a definite trend to adopt plant based products due to the cumulative derogatory effects resulting from the use of antibiotic and synthetics and except for a few cultivated crops, the availability of plant based material is mainly from the natural sources like forests and wastelands. There is a need to introduce these crops into the cropping system of the country, which, besides meeting the demands of the industry, will also help to maintain the standards on quality, potency and chemical composition. During the past decade, demand for aromatic plants and its products has attracted the worldwide interest, India being the treasure house of biodiversity, accounts for thousands of species which are used in herbal drugs.

---

90% of herbal industry requirement of raw material is taken out from the forests. This book basically deals with cultivation of *matricaria chamomilla*, present agro production technology status of celery, cultivation of *ocimum gratissimum* linn. var *clocimum*, the production and perfume potential of *jasminum* collections, chemical modification of turmeric oil to more value added products, biologically active compounds from turpentine oil, folk medicinal uses of indigenous aromatic plants in nepal , traditional uses of selected aromatic plants of bhutan and their cultivation prospects, blending aspects of perfumes with turpentine constituents, the chemistry of mint flavour, essential oils of *cinnamomum* species, citral containing *cymbopogon* species etc. The aim of publishing this book is to provide multidisciplinary information on aromatic plants. The book covers method of cultivation and utilization of various aromatic plants. This is very useful book for farmers, technocrats, agriculture universities, libraries, new entrepreneurs etc.

**Phytoremediation Potential of Bioenergy Plants**  
World Health Organization  
*Polycyclic Hydrocarbons and Cancer, Volume 1: Environment, Chemistry, and Metabolism* brings together information from many diverse disciplines in the environmental, chemical, biological, and medical sciences to provide a comprehensive account of the link between polycyclic aromatic hydrocarbons (PAHs) and cancer. This volume consists of 19 chapters divided into seven sections based on the following themes: Energy Sources; Environmental Occurrence and Monitoring; Tobacco Carcinogenesis; Chemistry, Carcinogenicity, and Theory; Metabolism and Activation; Enzymology; and Pharmacokinetics. The first three chapters focus on the energy sources, occurrence and surveillance, and environmental monitoring of PAHs. The discussion then turns to the link between smoking and cancer; the carcinogenicity of 5-methylchrysene; synthesis

---

and reactions of diol epoxides and related metabolites of carcinogenic hydrocarbons; and enzymes of oxygenation. The final chapter is devoted to the pharmacokinetics of chemically reactive metabolites. This book will be of interest to investigators and educators concerned with scientific aspects of PAH research; government officials and elected representatives as well as industry leaders who must confront and solve the problems related to PAHs; and others in various fields such as chemistry, environmental science, biochemistry and enzymology, pharmacology, molecular and cell biology, and genetics.

Future Sources of Organic Raw Materials:

CHEMRAWN I Springer Science & Business Media

This volume is aimed at offering an insight into the present knowledge of the vast domain of Medicinal and Aromatic Plants with a focus on North America. In this era of global climate change the volume is meant to provide an important

contribution to a better understanding of the diverse world of Medicinal and Aromatic Plant research, production and utilization.

Development of Plant-Based Medicines: Conservation, Efficacy and Safety Frontiers Media SA

This book presents WHO guidelines for the protection of public health from risks due to a number of chemicals commonly present in indoor air. The substances considered in this review, i.e. benzene, carbon monoxide, formaldehyde, naphthalene, nitrogen dioxide, polycyclic aromatic hydrocarbons (especially benzo[a]pyrene), radon, trichloroethylene and tetrachloroethylene, have indoor sources, are known in respect of their hazardousness to health and are often found indoors in concentrations of



---

health concern. The guidelines are targeted at the first time, the renewable production of public health professionals involved in preventing health risks of environmental exposures, as well as specialists and authorities involved in the design and use of buildings, indoor materials and products. They provide a scientific basis for legally enforceable standards.

#### *4th Applied Synthetic Biology in Europe*

Metabolic engineering of *Pseudomonas putida* for the production of aromatics from glucose. This dissertation focuses on the biosynthetic production of aromatic fine chemicals in engineered *Escherichia coli* from renewable resources. The discussed metabolic pathways take advantage of key metabolites in the shikimic acid pathway, which is responsible for the production of the aromatic amino acids phenylalanine, tyrosine, and tryptophan. For

benzaldehyde and benzyl alcohol has been achieved in recombinant *E. coli* with a maximum titer of 114 mg/L of benzyl alcohol. Further strain development to knockout endogenous alcohol dehydrogenase has reduced the *in vivo* degradation of benzaldehyde by 9-fold, representing an improved host for the future production of benzaldehyde as a sole product. In addition, a novel alternative pathway for the production of protocatechuate (PCA) and catechol from the endogenous metabolite chorismate is demonstrated. Titers for PCA and catechol were achieved at 454 mg/L and 630 mg/L, respectively. To explore potential routes for improved aromatic product yields, an *in silico* model using elementary mode analysis was developed. From the model, stoichiometric optimums maximizing both

---

product-to-substrate and biomass-to-substrate yields were discovered in a co-fed model using glycerol and D-xylose as the carbon substrates for the biosynthetic production of catechol.

Overall, the work presented in this dissertation highlights contributions to the field of metabolic engineering through novel pathway design for the biosynthesis of industrially relevant aromatic fine chemicals and the use of *in silico* modelling to identify novel approaches to increasing aromatic product yields.

### **The Colorado School of Mines Magazine**

ASIA PACIFIC BUSINESS PRESS Inc.

Optically pure aromatic D-amino acids, such as D-phenylalanine (D-Phe) and its derivatives, are high-value building blocks for the pharmaceutical industry. These compounds can be prepared using biocatalytic methods relying on various enzymes, including

aminotransferases (ATs). ATs, also called transaminases (EC 2.6.1.X), are a subclass of pyridoxal 5'-phosphate-dependent enzymes that catalyze the transfer of the amino group from a donor substrate to a ketone acceptor. Synthesis of optically-pure amino acids using whole-cell biocatalytic cascades based on ATs possess several advantages compared to traditional chemical methods, including excellent enantioselectivity and increased process and step efficiency, which is achieved through the catalysis of multiple steps in one-pot reactions without requirement for intermediate work-ups, cofactor recycling, or toxic metals. However, enzyme biocatalysts typically need to be engineered to alter their substrate specificity or to increase their catalytic efficiency, which has limited their industrial application. Therefore, to facilitate the engineering process of ATs

---

broadly and to produce aromatic D-amino acids, we developed a high-throughput assay for the testing of a broad range of ATs against libraries of potential substrates, and developed a biocatalytic cascade to produce optically pure aromatic D-amino acids.

*Plant Sciences Reviews 2011* Springer Nature

The meeting focused on medicinal, culinary and aromatic plants in the Near East countries with the following objectives: to discuss the present resource situation and utilization status of medicinal, culinary and aromatic plants as well as other NWFP in the Near East region, their potential and the problems and issues to be faced for their sustainable development; to identify and propose priorities of action for conservation and sustainable development of medicinal, culinary and aromatic plants products in the Near East; and to exchange

ideas for establishing a regional network on medicinal plants in the region.

*Aromatic Tolerance and Utilization Mechanisms of Rhodococcus Opacus PD630 to Produce Value-added Products from Lignin* Elsevier

This volume, as the seventh of the series Medicinal and Aromatic Plants of the World, deals with the medicinal and aromatic plant (MAPs) treasures of the so-called Southern Cone, the three southernmost countries (Argentina, Chile and Uruguay) of South America. Similarly to the previous volumes of the series, the main focus is to collect and provide information on major aspects of botany, traditional usage, chemistry, production / collection practices, trade and utilization of this specific group of plants. The contributors, who are recognized professionals and specialist of the domain, have collected and present state of the art information on 41 species. Most of these are not only of interest from the scientific point of view, but hold also a potential for the prospective

---

utilization of the decreasing, occasionally overexploited / endangered medicinal plant resources of this huge continent. The book is expected to serve as a source of information also on some less known or less studied species. As such the volume is expected to support future research and public health professionals.

*Conservation and Utilization of Medicinal and Aromatic Plants* Springer Nature

Lignocellulosic biomass is a potential renewable feedstock for the microbial production of fuels and chemicals. For microbial utilization, lignocellulosic biomass must undergo pretreatment (e.g., thermochemical and enzymatic processing) to release fermentable sugars. Lignin comprises ~15-30% of lignocellulosic biomass, and lignin-derived aromatic compounds released during pretreatment

can inhibit the microbial conversion of lignocellulosic sugars to bioproducts. Additionally, cost-effective separation of lignin and lignin by-products from lignocellulosic sugars remains a challenge, and current processes generate large waste streams that are typically burned or discarded. Thus, efforts are underway to improve microbial tolerance to lignin by-products and to develop approaches for valorizing waste lignin. *Rhodococcus opacus* PD630 is a promising biofuel production strain that can 1) consume lignocellulosic sugars, 2) accumulate large amounts of triacylglycerols (biodiesel precursors), and 3) tolerate and consume lignin-derived aromatic compounds. Understanding *R. opacus* aromatic tolerance

---

and utilization mechanisms could lead to the development of this strain for cost-effective fuel and chemical production from lignocellulosic biomass. To this end, the aromatic tolerance and utilization mechanisms of *R. opacus* were explored by combining adaptive evolution and -omics approaches. *R. opacus* was adaptively evolved on both individual and mixtures of lignin model compounds, and multiple mutants were identified with improved aromatic tolerance and utilization compared to the ancestral (wild-type) strain. Whole genome sequencing of adapted strains revealed genes with mutations across multiple adaptive evolutionary lineages that could affect aromatic tolerance and utilization. Transcriptomics of adapted

strains using aromatic compounds as carbon sources elucidated degradation pathways for five lignin model compounds. Furthermore, knockout studies of upregulated aromatic transporters suggest that aromatic transport is an integral part of aromatic tolerance and utilization. Lipidomic analysis of one adapted strain showed that adaptation affected the outer membrane composition during growth using a lignin model compound as a sole carbon source, which could also affect aromatic tolerance and utilization. Finally, adapted strains demonstrated improved conversion of lignin model compounds into lipids, suggesting that *R. opacus* has promise as a biofuel production host. Together, these results provide new insight into aromatic tolerance

---

and utilization mechanisms and demonstrate the potential of *R. opacus* for biofuel production and lignin valorization applications.

Resources for Freedom CRC Press

This report presents a cost analysis of 2,5-Furandicarboxylic Acid (FDCA) production from raw sugar (sucrose) The process examined is a non-commercial route based concepts presented on recently published patents and articles. In this process, sucrose is hydrolyzed into glucose and fructose and the glucose obtained is isomerized into fructose. The resulting fructose is dehydrated to hydroxymethylfurfural (HMF) in ionic liquid medium, which is then oxidized to FDCA. This report was developed based essentially on the following reference(s): (1) DE Patent 102008009933, issued to Friedrich-Schiller-

Universitat Jena, in 2009 (2) US Patent 20140256964 issued to Eastman in 2014  
Keywords: Green FDCA, Hydroxyl Methyl Furan, HMF, ionic liquid

**Biotechnological Production and Conversion of Aromatic Compounds and Natural Products** Apprimus Wissenschaftsverlag

It was in late 2002 that the idea of preparing a collection of multi-authored chapters on different aspects of ag- st forestry as a compendium for the 1 World Congress of Agroforestry, June 2004, was tossed around. With the approval of the idea by the Congress Organizing Committee, serious efforts to make it a reality got under way in early 2003. The rigorously peer-reviewed and edited manuscripts were submitted to the publisher in December 2003. Considering the many different individuals involved in the task as

---

authors and manuscript reviewers, we feel quite pleased that the task could be accomplished within this timeframe. We are pleased also about the contents on several counts. First of all, the tropical-temperate mix of topics is a rare feature of a publication of this nature. In spite of the scientific commonalities between tropical and temperate practices of agroforestry, the differences between them are so enormous that it is often impossible to mesh them together in one publication. Secondly, several of the chapters are on topics that have not been discussed or described much in agroforestry literature. A third feature is that some of the authors, though well known in their own disciplinary areas, are somewhat new to agroforestry; the perceptions and outlooks of these scholars who are relatively uninfluenced by the past happenings in agroforestry gives a whole new dimension to agroforestry and broadens the scope of the subject. Finally, rather than just reviewing and summarizing past work, most chapters take the extra effort in attempting to outline the next steps.

Medicinal and Aromatic Plants of North America Springer Science & Business Media Vols. 7- include "Abstracts" which, beginning with v. 9 form a separately paged section, and from v. 17 on, have separate title pages.

Petroleum Review Elsevier

The 'plant' is often the most neglected part of plant-based medicine. Throughout time, humans have searched, collected, and effectively used plants for healing. Currently, the medicinal plant-based business is flourishing at a dramatic pace and at the expense of an already declining population of plant species, many of which are on the verge of extinction. In spite of this history and popularity, the mystery of what transforms a plant into a

---

medicinal plant persists, and there are chronic problems with ensuring the safety and efficacy of medicinal plant products. Therefore, there is a real need for a full characterization of medicinal plant species and for the development and application of novel technologies for the production of plant-based medicines. This book highlights some of the recent advances and new approaches to the development of technologies for plant-based medicines and is intended to stimulate new discussions among researchers, regulatory authorities, and pharmaceutical organizations, leading to significant advancements in the field.

**Medicinal and Aromatic Plants of South America Vol. 2** Springer

& Quot;Plant Sciences Reviews 2011" provides scientists and students in the field with timely analysis on key topics in current research. Originally published online in CAB Reviews, this volume makes available in printed form the reviews in plant sciences published during 2011.

**CABI**

Aromatic compounds have traditionally been generated via petroleum feedstocks and have wide ranging applications in a variety of fields such as cosmetics, food, plastics, and pharmaceuticals. Substantial improvements have been made to sustainably produce many aromatic chemicals from renewable sources utilizing microbes as bio-factories. By assembling and optimizing native and non-native pathways to produce natural and non-natural bioproducts, the diversity of biochemical aromatics which can be produced is constantly being improved upon. One such compound, 2-Phenylethanol (2PE), is a key molecule used in the fragrance and food industries, as well as a potential biofuel. Here, a novel, non-natural pathway was engineered in *Escherichia coli* and subsequently evaluated. Following strain and bioprocess optimization, accumulation of inhibitory acetate byproduct was reduced and 2PE titers approached 2 g/L - a ~2-fold increase over



---

previously implemented pathways in *E. coli*. Furthermore, a recently developed mechanism to allow *E. coli* to consume xylose and glucose, two ubiquitous and industrially relevant microbial feedstocks, simultaneously was implemented and systematically evaluated for its effects on L-phenylalanine (Phe; a precursor to many microbially-derived aromatics such as 2PE) production. Ultimately, by incorporating this mutation into a Phe overproducing strain of *E. coli*, improvements in overall Phe titers, yields and sugar consumption in glucose-xylose mixed feeds could be obtained. While upstream efforts to improve precursor availability are necessary to ultimately reach economically-viable production, the effect of end-product toxicity on production metrics for many aromatics is severe. By utilizing a transcriptional profiling technique (i.e., RNA sequencing), key insights into the mechanisms behind styrene-induced toxicity in *E. coli* and the cellular response systems that are activated to

maintain cell viability were obtained. By investigating variances in the transcriptional response between styrene-producing cells and cells where styrene was added exogenously, better understanding on how mechanisms such as the phage shock, heat-shock and membrane-altering responses react in different scenarios. Ultimately, these efforts to diversify the collection of microbially-produced aromatics, improve intracellular precursor pools and further the understanding of cellular response to toxic aromatic compounds, give insight into methods for improved future metabolic engineering endeavors.