"Año del Centenario de la Promulgación de la Constitución Política de los Estados Unidos Mexicanos"

Oficina: RECURSOS HUMANOS
D.R.H. 142/17.
ASUNTO: Carta de adscripción

MTRO. MANUEL QUINTERO QUINTERO
DIRECTOR GENERAL DEL TECNOLÓGICO
NACIONAL DE MÉXICO
PRESENTE

El que suscribe Jefe del Departamento de Recursos Humanos del Instituto Tecnologico de durango, por este conducto hace **CONSTAR** que de acuerdo a la documentación existente en los archivos del Dpto de Recursos Humanos, la **C. Dra. Nuria Elizabeth Rocha Guzmán,** con **RFC ROGN6902289H9** y con clave presupuestal **E3863,** con status **(10),** y fecha de ingreso al SNIT el **1 DE ABRIL DE 2000** cuenta con 16 años de adscripción a este instituto.

Se extiende la presente a petición del interesado para los fines legales a que hubiera lugar, en la ciudad de Durango Dgo. a 13 de Marzo de 2017

ATENTAMENTE
"La Técnica al Servicio de la Patria"

ING. JUAN VANEGAS RENTERÍA
JEFE DEL DEPARTAMENTO DE
RECURSOS HUMANOS

CONACYT

Consejo Nacional de Ciencia y Tecnología

El Sistema Nacional de Investigadores otorga a la

DRA. NURIA ELIZABETH ROCHA GUZMAN

la distinción de

INVESTIGADOR NACIONAL NIVEL II

Durante el periodo del 1 de enero de 2016 al 31 de diciembre de 2019 en virtud de sus logros en la realización de investigación original, reconocida, apreciable y de manera consistente, así como en la formación de recursos humanos para la investigación.

Dra. Julia Tagüeña Parga
Secretaria Ejecutiva del SNI

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Documento firmado electrónicamente.
15 de diciembre de 2015

"2015, Año del Generalísimo José María Morelos y Pavón"

México, D. F., 21 de Julio de 2015
Oficio No. DSA/103.5/15/8557

Rocha Guzman Nuria Elizabeth
Instituto Tecnológico de Durango
Presente

Me complace informarle que el Comité Evaluador externo al PRODEP, de acuerdo con las Convocatorias 2015, resolvió positivamente su solicitud de Reconocimiento a Perfil Deseable.

En consecuencia, la SES acredita que usted tiene el perfil deseable para profesores de tiempo completo.

La acreditación tiene validez por 3 años a partir de esta fecha y servirá para los fines establecidos en la propia convocatoria, en el entendido de que dejar de laborar en esta institución conlleva la cancelación del reconocimiento.

Sin otro particular, aprovecho la oportunidad para enviarle un saludo.

Atentamente

M. en C. Guillermina Urbano Vidales

Directora

Calle Vicente García Torres # 235, Col. El Rosedal, Delegación Coyoacán, Distrito Federal. CP. 04330,
Tel. (55) 3601-1000 Extensión: 65934 http://dsa.sep.gob.mx

SECRETARÍA DE EDUCACIÓN PÚBLICA

DIRECCIÓN GENERAL DE PROFESIONES

CÉDULA 6623174

EN VIRTUD DE QUE

NURIA ELIZABETH
ROCHA
GUZMÁN

CURP: ROGN680228MDGCZR04

CUMPLIÓ CON LOS REQUISITOS EXIGIDOS POR LA LEY REGLAMENTARIA DEL ARTÍCULO 5o. CONSTITUCIONAL RELATIVO AL EJERCICIO DE LAS PROFESIONES EN EL DISTRITO FEDERAL Y SU REGLAMENTO SE LE EXPIDE

EN EDUCACIÓN DE TIPO SUPERIOR LA

CÉDULA

PERSONAL CON EFECTOS DE PATENTE PARA EJERCER PROFESIONALMENTE EN EL NIVEL DE

DOCTORADO EN
CIENCIAS DE LOS ALIMENTOS

VÍCTOR EVERARDO BELTRÁN CORONA
DIRECTOR GENERAL DE PROFESIONES

CÉDULA 6623174

SEP

México D.F. 1 de Septiembre del 2010

FIRMA DEL TITULAR

Copia fiel de la original

Dra. Nuria Rocha

México, D.F., 09 de Abril del 2015
Oficio Nº DSA/103.5/15/2779

Integrantes
José Alberto Gallegos Infante
Martha Roció Moreno Jiménez
Nuria Elizabeth Rocha Guzmán
Rubén Francisco González Laredo

Instituto Tecnológico de Durango
Presentes

Me complace informarles que el Comité Evaluador externo al Programa, de acuerdo con lo establecido en las Reglas de Operación 2014, ha dictaminado que el Cuerpo Académico "**Alimentos funcionales y nutracéuticos**" con clave **ITDUR-CA-5** se encuentra **CONSOLIDADO**.

En consecuencia, la Subsecretaría de Educación Superior (SES), a través de este Programa, acredita el registro de este Cuerpo Académico por **5** años a partir de esta fecha, por lo que será evaluado nuevamente en el año **2020** o cuando le sea requerido por la Dirección de Superación Académica con el propósito de valorar los avances en su desarrollo.

Sin otro particular, aprovecho la oportunidad para reiterarle la seguridad de mis más distinguidas consideraciones.

A t e n t a m e n t e

M. en C. Guillermina Urbano Vidales
Directora

Ciudad de México, 25 de Noviembre de 2016
Oficio No. DSA/103.5/16/15091

Ing. Mecán Pérez Jesús Astorga
Director
Instituto Tecnológico de Durango
Presente

Acerca del informe de resultados del tercer año presentado por la red temática de colaboración académica aprobada en el marco de la convocatoria 2011, le informo el resultado del proyecto en el que participa un cuerpo académico de su Institución:

I. Red con informe aprobado:

Nombre de la Red	Cuerpo Académico iniciador	Integrantes	Institución de los Integrantes
Nanotecnología y Omics para el Estudio de Nutracéuticos	ITDUR-CA-5 - Alimentos Funcionales y Nutracéuticos	Calidad, Seguridad y Bioactividad de Alimentos Vegetales (Responsable:ITDUR-CA-5)	Centro de Edafología y Biología Aplicada del Segura - CSIC
		ITCEL-CA-2 - Biotecnología Molecular	Instituto Tecnológico de Celaya
		Grupo de Investigación en Metabolismo, Microbiota Intestinal y Salud (Responsable:ITCEL-CA-2)	Universidad Europea de Madrid, España
		Reologia y Nanomateriales de Liberación Controlada (Responsable:ITDUR-CA-5)	Universidad Nacional Autónoma de México, México

II. Grupos de investigación externos al PRODEP que se encuentran bajo la responsabilidad del cuerpo académico de su Institución:

Nombre de la Red	Cuerpo Académico responsable de las actividades del grupo de investigación externo	Grupo de investigación externo	Institución
Nanotecnología y Omics para el Estudio de Nutracéuticos	ITDUR-CA-5 - Alimentos funcionales y nutracéuticos	Calidad, Seguridad y Bioactividad de Alimentos Vegetales	Centro de Edafología y Biología Aplicada del Segura - CSIC
		Reología y Nanomateriales de Liberación Controlada	Universidad Nacional Autónoma de México, México

El dictamen y el acuse que debe firmar el responsable del cuerpo académico han sido enviados por correo electrónico al Representante Institucional con la solicitud de que el acuse se entregue en esta Dirección a más tardar el **24 de enero de 2017**.

Por último, le comento que para finalizar el compromiso adquirido por el cuerpo académico es necesario que se envíe a esta Dirección, a más tardar el 24 de febrero de 2017, el reporte financiero sobre el ejercicio de los recursos recibidos. Este reporte debe entregarse desglosado por cada uno de los tres años de apoyo y de acuerdo con los rubros y montos autorizados, tanto para el cuerpo académico de su Institución como para los grupos de investigación externos que hayan tenido a su cargo.

Sin otro particular, aprovecho la oportunidad para reiterarle la seguridad de mis más distinguidas consideraciones.

Atentamente

M. en C. María de Jesús Guillermina Urbano Vidales
Directora

C.c.p. **Mtro. Manuel Quintero Quintero**, Director General del Tecnológico Nacional de México. Presente.
C.c.p. **L.E. Rosario Otilia Salazar Herrera**, Representante Institucional ante el Programa. Para su conocimiento.

MJGUV/MEGR/PRR

RED NACIONAL DE INVESTIGACIÓN, INNOVACIÓN Y DESARROLLO TECNOLÓGICO EN

ALIMENTOS

FUNCIONALES Y NUTRACÉUTICOS

CONACYT

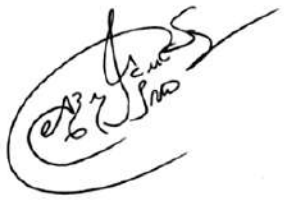
La Red de Nacional de Investigación, Innovación y Desarrollo Tecnológico en Alimentos Funcionales y Nutracéuticos "AlFaNutra"

del Consejo Nacional de Ciencia y Tecnología (CONACyT)

hace que constar que el (la):

Dra. Nuria Elizabeth Rocha Guzmán

Es miembro ACTIVO de la Red, como parte del Cuerpo Académico de Alimentos Funcionales y Nutracéuticos del Instituto Tecnológico de Durango, participando en las reuniones generales de trabajo durante el 2014.



Dr. Gustavo Adolfo González-Aguilar

Dr. Aarón Fernando González-Córdova

Coordinadores de la Red AlFaNutra

CIAD

MÉXICO
GOBIERNO DE LA REPÚBLICA

CONACYT
Consejo Nacional de Ciencia y Tecnología

El Consejo Nacional de Ciencia y Tecnología

Otorga la presente

Constancia

a la

Dra. Nuria Elizabeth Rocha Guzmán

Como

Integrante de la Subcomisión del Área, de Biotecnología y Ciencias Agropecuarias

de la Convocatoria de Investigación Científica Básica 2013.

México, D. F., Mayo de 2014

DR. LUIS HUMBERTO FABILA CASTILLO
DIRECTOR DE INVESTIGACIÓN CIENTÍFICA BÁSICA

DURANGO

Subdirección de Enseñanza, Capacitación
Investigación y Calidad en salud.

Asunto: Constancia

A quien corresponda.

Además de enviarle un cordial saludo, me permito manifestarle que la **C. D.C Nuria Elizabeth Rocha Guzmán**, quien ha sido designada por el **Instituto Tecnológico de Durango** como miembro suplente de la **Comisión Estatal de Bioética del Estado de Durango**, del mes de Agosto de 2014 a la fecha, ha trabajado de manera propositiva en las actividades de esta comisión, entre las que se incluyen el fomento a la ética en investigación y el análisis de políticas públicas.

Se extiende la presente constancia para los fines y usos legales del interesado, a los cuatro días del mes de febrero de 2015.

Agradezco de antemano la atención prestada al presente y me despido no sin antes reiterarle mi consideración más distinguida.

Atentamente

SECRETARÍA DE SALUD
SERVICIOS DE SALUD DURANGO

Dra. Karla Lidia Margarita Pizarro Lerma
Jefe de Investigación y Desarrollo Tecnológico
Servicios de Salud de Durango y
Coordinadora Operativa de la Comisión Estatal de Bioética

KLMPL/*

"2014 año del 60 Aniversario de la Cinematografía Durango"

MÉXICO
GOBIERNO DE LA REPÚBLICA

CONACYT
Consejo Nacional de Ciencia y Tecnología

El Consejo Nacional de Ciencia y Tecnología

Otorga la presente

Constancia

a la

Dra. Nuria Elizabeth Rocha Guzmán

Como

Integrante de la Comisión del Área, de Biotecnología y Ciencias Agropecuarias

de la Convocatoria de Investigación Científica Básica 2014.

México, D. F., Noviembre de 2014

DR. LUIS HUMBERTO FABILA CASTILLO
DIRECTOR DE INVESTIGACIÓN CIENTÍFICA BÁSICA

MÉXICO
GOBIERNO DE LA REPÚBLICA

CONACYT
Consejo Nacional de Ciencia y Tecnología

El Consejo Nacional de Ciencia y Tecnología

Otorga la presente

Constancia

a la

Dra. Nuria Elizabeth Rocha Guzmán

Como

Integrante de la Comisión del Área, de Biotecnología y Ciencias Agropecuarias

de la Convocatoria de Investigación Científica Básica 2015.

México, D. F., Octubre de 2015

DR. LUIS HUMBERTO FABILA CASTILLO
DIRECTOR DE INVESTIGACIÓN CIENTÍFICA BÁSICA

SEP

SECRETARÍA DE EDUCACIÓN PÚBLICA

DSA
Dirección de Superación Académica

prodep
TIPO SUPERIOR

LA DIRECCIÓN DE SUPERACIÓN ACADÉMICA DE LA DIRECCIÓN GENERAL DE EDUCACIÓN SUPERIOR UNIVERSITARIA OTORGA LA PRESENTE:

CONSTANCIA

A ROCHA GUZMÁN NURIA ELIZABETH

POR SU PARTICIPACIÓN EN LA EVALUACIÓN EN LÍNEA DE LAS SOLICITUDES DE "RECONOCIMIENTO Y/O APOYO A PROFESORES DE TIEMPO COMPLETO CON PERFIL DESEABLE", CONVOCATORIA 2015.

JULIO DE 2015

M. EN C. GUILLERMINA URBANO VIDALES
DIRECTORA DE SUPERACIÓN ACADÉMICA

SEP
SUBSECRETARÍA DE EDUCACIÓN SUPERIOR
DIRECCIÓN GENERAL DE EDUCACIÓN SUPERIOR UNIVERSITARIA
DIRECCIÓN DE SUPERACIÓN ACADÉMICA

SEP

SECRETARÍA DE
EDUCACIÓN PÚBLICA

El Tecnológico Nacional de México

Otorga la presente

Constancia

a la

Dra. Nuria Elizabeth Rocha Guzmán

Por su invaluable apoyo en la "Reunión de Evaluación de Programas de Posgrado" realizada del 25 al 27 de febrero de 2015, con duración de 30 horas

México, D.F., a 27 de Febrero de 2015.

Dr. Luis Néstor Coria de los Ríos
Director de Estudios de Posgrado e Investigación

MÉXICO
GOBIERNO DE LA REPÚBLICA

CONACYT
Consejo Nacional de Ciencia y Tecnología

El Consejo Nacional de Ciencia y Tecnología

Otorga la presente

Constancia

a la

Dra. Nuria Elizabeth Rocha Guzmán

Como

Integrante de la Comisión de Evaluación de Pertinencia de la
Convocatoria de Proyectos de Desarrollo Científico Para Atender Problemas Nacionales 2015.
Tecnología de los Alimentos
México, D. F., Marzo de 2016

DR. LUIS HUMBERTO FABILA CASTILLO
DIRECTOR DE INVESTIGACIÓN CIENTÍFICA BÁSICA

El **Gobierno del Estado de Durango** a través de la **Secretaría de Salud** otorga la presente

Constancia

A:

Villegas Novoa Cecilia, Rocha Guzmán Nuria Elizabeth, Moreno Jiménez Martha Rocío, Gallegos Infante José Alberto, González Laredo Rubén Francisco.

Por haber obtenido **PRIMER LUGAR** con el trabajo: "***EFECTO DE UN EXTRACTO DE SALVILLA (Buddleja scordioides K.) SOBRE LA EXPRESIÓN DIFERENCIAL DE MEDIADORES INFLAMATORIOS INDUCIDOS CON LIPOPOLISACÁRIDO EN CÉLULAS EPITELIALES DE HUMANO"***

en la categoría: *INVESTIGACIÓN EN BIOTECNOLOGÍA E INNOVACIÓN*

en el XV Concurso de Trabajos de Investigación en Salud

realizado en el marco I Jornada Nacional de Investigación en Salud Durango 2017

José Rosas Aispuro Torres

Gobernador del Estado de Durango

Dr. César Humberto Franco Mariscal

Secretario de Salud y Dir. Gral. de los Servicios de Salud

Victoria de Durango, Dgo. a Agosto de 2017

El **Gobierno del Estado de Durango** a través de la **Secretaría de Salud** otorga la presente

Constancia

A:

Reyna-Rojas, J.A., Moreno-Jimenez, M.R., Rocha-Guzmán, N.E., Gallegos-Infante, J.A., Gonzalez-Laredo, R.F., y Rojas-Contreras, J.A.

Por haber obtenido **SEGUNDO LUGAR** con el trabajo: "***POTENCIAL PREBIÓTICO DE FRIJOL (Phaseolus vulgaris L.) BAYO VICTORIA PROCESADO"***

en la categoría: *INVESTIGACIÓN EN BIOTECNOLOGÍA E INNOVACIÓN*

en el XV Concurso de Trabajos de Investigación en Salud

realizado en el marco I Jornada Nacional de Investigación en Salud Durango 2017

José Rosas Aispuro Torres

Gobernador del Estado de Durango

Dr. César Humberto Franco Mariscal

Secretario de Salud y Dir. Gral. de los Servicios de Salud

Victoria de Durango, Dgo. a Agosto de 2017

El **Gobierno del Estado de Durango** a través de la **Secretaría de Salud** otorga la presente

Constancia

A:

Julio C Ramírez-España, Nuria E. Rocha-Guzmán, Rubén F. González-Laredo Alberto Gallegos-Infante. Claudia I. Gamboa-Gómez

Por haber obtenido **TERCER LUGAR** con el trabajo: "***Biodisponibilidad y actividad antioxidante de compuestos fenólicos de bebidas vegetales de hojas de encino fermentadas con hongo kombucha"***

en la categoría: *INVESTIGACIÓN EN BIOTECNOLOGÍA E INNOVACIÓN*

en el XV Concurso de Trabajos de Investigación en Salud

realizado en el marco I Jornada Nacional de Investigación en Salud Durango 2017

José Rosas Aispuro Torres

Gobernador del Estado de Durango

Dr. César Humberto Franco Mariscal

Secretario de Salud y Dir. Gral. de los Servicios de Salud

Victoria de Durango, Dgo. a Agosto de 2017

DURANGO
GOBIERNO DEL ESTADO

EL CONSEJO DE CIENCIA Y TECNOLOGÍA DEL ESTADO DE DURANGO

DURANGO
Consejo de Ciencia y Tecnología

Otorga la presente

CONSTANCIA

A: *Dra. Nuria Elizabeth Rocha Guzmán*

COMO CO-DIRECTORA DE TESIS

DEL PREMIO A LA MEJOR TESIS DE POSGRADO DURANGO 2015
EN LA MODALIDAD DE MAESTRÍA, EN EL ÁREA DE:

CIENCIAS DE LA SALUD

CON EL TRABAJO DE INVESTIGACIÓN:

"Efecto de bebidas funcionales en la modulación de enzimas antioxidantes y marcadores de inflamación gastro-intestinal en un modelo *in vivo*"

Victoria de Durango, Dgo. Diciembre de 2015

DR. ELISEO MEDINA ELIZONDO
Director General del Consejo de Ciencia
y Tecnología del Estado de Durango

DURANGO
Consejo de Ciencia y Tecnología

DURANGO
GOBIERNO DEL ESTADO

EL CONSEJO DE CIENCIA Y TECNOLOGÍA DEL ESTADO DE DURANGO

DURANGO
Consejo de Ciencia y Tecnología

Otorga la presente

CONSTANCIA

A: *Dra. Nuria Elizabeth Rocha Guzmán*

COMO DIRECTORA DE TESIS

DEL PREMIO A LA MEJOR TESIS DE POSGRADO DURANGO 2015
EN LA MODALIDAD DE MAESTRÍA, EN EL ÁREA DE:

INGENIERÍAS, DESARROLLO INDUSTRIAL Y TECNOLÓGICO

CON EL TRABAJO DE INVESTIGACIÓN:

"Estudio de la permeabilidad, efectos antiinflamatorios y posible mecanismo de acción de lupeol nanoencapsulado en un modelo celular humano de absorción intestinal"

Victoria de Durango, Dgo. Diciembre de 2015

DR. ELISEO MEDINA ELIZONDO
Director General del Consejo de Ciencia y Tecnología del Estado de Durango

DURANGO
Consejo de Ciencia y Tecnología

DURANGO
GOBIERNO DEL ESTADO

EL GOBIERNO ESTADO DE DURANGO

Y LA SECRETARÍA DE EDUCACIÓN DEL ESTADO

A TRAVÉS DEL

CONSEJO DE CIENCIA Y TECNOLOGÍA DEL ESTADO DE DURANGO

DURANGO
Consejo de Ciencia y Tecnología

Otorgan el presente

RECONOCIMIENTO

A: Dra. Nuria Elizabeth Rocha Guzmán
Dr. José Alberto Gallegos Infante
Dr. Rubén Francisco González Laredo
Dra. Martha Rocío Moreno Jiménez
Dr. Luis Medina Torres

PREMIO ESTATAL DE CIENCIA, TECNOLOGÍA E INNOVACIÓN DURANGO 2015

EN EL ÁREA DE:

INGENIERÍAS, DESARROLLO INDUSTRIAL Y TECNOLÓGICO

CON EL TRABAJO DE INVESTIGACIÓN:

Desarrollo tecnológico para obtener nanopartículas bioactivas de poli-(DLLactida- Co-Glicolida) cargadas con lupeol de hojas de encino

Victoria de Durango, Dgo. Noviembre de 2015

ING. HECTOR E. VELA VALENZUELA
Secretario de Educación
del Estado de Durango

C.P. JORGE HERRERA CALDERA
Gobernador Constitucional del Estado de Durango

DR. ELISEO MEDINA ELIZONDO
Director General del Consejo de Ciencia
y Tecnología del Estado de Durango

DURANGO
GOBIERNO DEL ESTADO

EL GOBIERNO DEL ESTADO DE DURANGO Y LA SECRETARÍA DE EDUCACIÓN A TRAVÉS DEL CONSEJO DE CIENCIA Y TECNOLOGÍA DEL ESTADO DE DURANGO

Unidos crecemos en ciencia, tecnología e innovación

CONSEJO DE CIENCIA Y TECNOLOGÍA DEL ESTADO DE DURANGO
COCYTED
1996
CIENCIA Y TECNOLOGÍA

Otorgan el presente

RECONOCIMIENTO

A la *Dra. Nuria Elizabeth Rocha Guzmán*

COMO DIRECTORA DEL PROYECTO MERECEDOR AL PREMIO A LA "MEJOR TESIS DE POSGRADO DURANGO 2012", EN EL ÁREA DE:

CIENCIAS DE LA SALUD

EN LA MODALIDAD DE MAESTRÍA, COLABORANDO A LA VINCULACIÓN DE LA CIENCIA, TECNOLOGÍA E INNOVACIÓN EN NUESTRO ESTADO.

Victoria de Durango, Dgo. Octubre 2012

ING. HECTOR VELA VALENZUELA
Secretario de Educación
del Estado de Durango

C.P. JORGE HERRERA CALDERA
Gobernador Constitucional del Estado de Durango

DR. JOSÉ DIMAS LÓPEZ MARTÍNEZ
Director General del Consejo de Ciencia
y Tecnología del Estado de Durango

EL GOBIERNO DEL ESTADO DE DURANGO Y LA SECRETARÍA DE EDUCACIÓN A TRAVÉS DEL CONSEJO DE CIENCIA Y TECNOLOGÍA DEL ESTADO DE DURANGO

DURANGO
GOBIERNO DEL ESTADO

Unidos crecemos en ciencia, tecnología e innovación

CONSEJO DE CIENCIA Y TECNOLOGÍA DEL ESTADO DE DURANGO
COCYTED
1996
CIENCIA Y TECNOLOGÍA

Otorgan el presente

RECONOCIMIENTO

A: *Dra. Martha Rosales Castro, Dra. Nuria Elizabeth Rocha Guzmán, Dr. Rubén Francisco González Laredo y Dr. José Alberto Gallegos Infante*

POR HABER SIDO MERECEDORES DEL PREMIO ESTATAL DE "CIENCIA, TECNOLOGÍA E INNOVACIÓN DURANGO 2012", EN EL ÁREA DE:

CIENCIAS EXACTAS E INGENIERÍA

COLABORANDO A LA VINCULACIÓN DE LA CIENCIA, TECNOLOGÍA E INNOVACIÓN EN PROYECTOS QUE HAN CONTRIBUIDO A ELEVAR EL DESARROLLO ACADÉMICO, CIENTÍFICO Y EMPRESARIAL EN NUESTRO ESTADO.

Victoria de Durango, Dgo. Octubre 2012

ING. HECTOR VELA VALENZUELA
Secretario de Educación
del Estado de Durango

C.P. JORGE HERRERA CALDERA
Gobernador Constitucional del Estado de Durango

DR. JOSÉ DIMAS LÓPEZ MARTÍNEZ
Director General del Consejo de Ciencia
y Tecnología del Estado de Durango

Universidad de Sonora

División de Ciencias Biológicas y de la Salud

Departamento de Investigación y Posgrado en Alimentos

otorga el presente **Reconocimiento** a:

Jacobo Valenzuela, N.

por haber obtenidó el PRIMER LUGAR categoría CARTEL ESTUDIANTIL, con el trabajo:

Efecto del procesamiento sobre compuestos polifenólicos y actividad antioxidante en harinas extrudidas de calabaza (*Cucurbita moschata* D.) cv Cehualca

en colaboración con: Zazueta-Morales, J.J., Gallegos-Infante, J.A., Aguilar-Palazuelos, E., Delgado-Nieblas, C.I., Ordorica-Falomir, C.A., Camacho-Hernández, I.L., Rocha-Guzmán, N. E. y Maróstica-Junior, M.R.

dentro del **VIII Congreso del Noroeste y IV Nacional en Ciencias Alimentarias y Biotecnología**, llevado a cabo del 27 de febrero al 1 de marzo de 2013, en San Carlos, Nuevo Guaymas, Sonora, México.

Dr. Mario O. Cortez Rocha
Director de la División de Ciencias Biológicas y de la Salud

Dr. Armando Burgos Hernández
Presidente del Comité Organizador

27 de febrero al 1 de marzo de 2013. San Carlos, Nuevo Guaymas, Sonora, México.

1.3.3.1.1

AMECA
ASOCIACION MEXICANA DE CIENCIAS DE LOS ALIMENTOS A.C.

otorga la

Constancia de Membresía

a

Dra. Nuria Elizabeth Rocha Guzmán

Con duración de Octubre del 2012 a Octubre del 2014

Monterrey, N.L. México, a 3 de junio del 2014.

Dr. J. Santos García A.
Presidente
Vo. Bo.

M.C. ISELA FLORES MONTENEGRO
SUBDIRECTORA ACADÉMICA

SEP INSTITUTO TECNOLOGICO de Durango
SUBDIRECCION ACADEMICA

1.2.6.1.1 Nacional

Copia fiel del original

SOMENTA
Sociedad Mexicana de Nutrición y Tecnología de Alimentos

LA SOCIEDAD MEXICANA DE
NUTRICIÓN Y TECNOLOGÍA DE ALIMENTOS

OTORGA LA PRESENTE

CONSTANCIA A:

Dra Nuria Elizabeth Rocha Guzmán

QUE LO ACREDITA COMO
MIEMBRO REGULAR

A PARTIR DE:

ENERO 2012
A DICIEMBRE DEL 2012

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SEP INSTITUTO TECNOLÓGICO de Durango SUBDIRECCION ACADEMICA

ASOCIACIÓN MEXICANA DE CIENCIA DE ALIMENTOS

CERTIFICADO DE MEMBRESÍA

El presente documento acredita que:

Dr. Nuria E. Rocha Guzmán

forma parte de la asociación en el período de octubre del 2016 a octubre del 2018 en calidad de

MIEMBRO ACTIVO

Dr. J. Hugo Sergio García Galindo
(Presidente)

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(Secretario)

SEP

AUT .ZACION DE COMISIONES AL EXTRANJERO

No.	10	CLAVE	COMEXTRA
COMEXTRA			
HOJA		FECHA	
1 DE 1		11	06	2014

EN EL USO DE LAS ATRIBUCIONES CONFERIDAS EN EL REGLAMENTO INTERIOR DE ESTA SECRETARÍA Y CON FUNDAMENTO EN EL ARTÍCULO 63, FRACCIÓN II, DEL REGLAMENTO DE LA LEY DE PRESUPUESTO, CONTABILIDAD Y GASTO PÚBLICO FEDERAL, SE LES NOTIFICA LA AUTORIZACIÓN PARA LLEVAR A CABO LA SIGUIENTE COMISIÓN:

SUBSECRETARIA	PERIODO TRIMESTRAL	ACUERDO No.
Subsecretaría de Educación Superior	Julio / Septiembre	

DATOS DEL COMISIONADO				DATOS DE LA COMISION				
					PERIODO DE LA COMISION			
NOMBRE	PUESTO	ADSCRIPCION		LUGAR	INICIO		DIAS	MOTIVO / JUSTIFICACION
		CLAVE	SIGLAS					
JOSÉ ALBERTO GALLEGOS INFANTE	DOCENTE	10DIT0004E	I. T. Durango	Madrid, España Murcia, España	07 07 2014 / 31 07 2014		25	Realizar una Estancia de Investigación en la Universidad Europea de Madrid, a fin de evaluar los avances técnicos-académicos de la red Nanotecnología y Omics para el estudio de nutracéuticos, así como la impartición de una conferencia y la participación en reuniones de trabajo para la integración de un nuevo grupo a la red ya establecida.
NURIA ELIZABETH ROCHA GUZMÁN	DOCENTE	10DIT0004E	I. T. Durango	Madrid, España Murcia, España	07 07 2014 / 31 07 2014		25	

FIRMAS

APRUEBA C. DIRECTOR GENERAL DE EDUCACIÓN SUPERIOR TECNOLÓGICA	AUTORIZA C. SUBSECRETARIO DE EDUCACIÓN SUPERIOR
MTRO. JUAN MANUEL CANTÚ VÁZQUEZ	DR. FERNANDO SERRANO MIGALLÓN

Ciudad de México, 16/marzo/2016
Oficio MOO/643/2016

ING. JESÚS ASTORGA PÉREZ
DIRECTOR DEL INSTITUTO TECNOLÓGICO DE DURANGO
PRESENTE

Con referencia a su oficio ITD DSE 12/16, donde solicita la Comisión al Extranjero a nombre de la profesora NURIA ELIZABETH ROCHA GUZMÁN, me permito comunicarle que dicha comisión ha sido autorizada, de acuerdo con los siguientes datos:

Evento	Estancia de Investigación
Tipo de evento	Estadía
Período de comisión	Del 01 al 30 de abril 2016
No. de días	30
Lugar de comisión	Madrid, España
Motivo / Justificación	Evaluar los avances del Proyecto "Efectos del consumo de fermentados de infusiones de encino con el hongo Kombucha: conversión metabólica de flavonoides y su efecto modulador en la función endotelial y enfermedad cardiovascular".
Cobertura de gastos	Los gastos de traslado, hospedaje y alimentación serán cubiertos por el Proyecto CONACyT 220614

No omito mencionar, que la profesora comisionada deberá entregar en su plantel de adscripción un informe de las actividades realizadas al término de dicha comisión.

Aprovecho la oportunidad para enviarle un cordial saludo.

ATENTAMENTE
Excelencia en Educación Tecnológica

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Oak kombucha protects against oxidative stress and inflammatory processes

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ABSTRACT

Black tea infusion is the common substrate for preparing kombucha; however other sources such as oak leaves infusions can be used for the same purpose. Almost any white oak species have been used for medicinal applications by some ethnic groups in Mexico and could be also suitable for preparing kombucha analogues from oak (KAO). The objective of this research was to investigate the antioxidant activity and anti-inflammatory effects of KAO by examining its modulation ability on macrophage-derived TNF-alpha and IL-6. Herbal infusions from oak and black tea were fermented by kombucha consortium during seven days at 28 °C. Chemical composition was determined by LC-ESI-MS/MS. The antioxidant activity of samples against oxidative damage caused by H_2O_2 in monocytes activated (macrophages) was explored. Additionally, it was determined the anti-inflammatory activity using lipopolysaccharide (LPS) - stimulated macrophages; in particular, the nitric oxide (NO), TNF-alpha, and IL-6 production was assessed. Levels of pro-inflammatory cytokines IL-6 and TNF-alpha were significantly reduced by the sample treatment. Likewise, NO production was lower in treatment with kombucha and KAO compared with LPS-stimulated macrophages. Fermented beverages of oak effectively down-regulated the production of NO, while pro-inflammatory cytokines (TNF-alpha and IL-6) in macrophages were stimulated with LPS. Additionally, phytochemical compounds present in KAO decrease oxidative stress.

1. Introduction

Some fermented foods have transcended their sources to become everyday products in more than one continent; fermentations involved in these foods are of enormous complexity, and their study has provided us a wealth of biotechnology knowledge. An attractive bioprocess consists on the degradation of glucose and fructose through the fermentation action of a bacterial and yeast consortium called Kombucha [6]. This Kombucha is a fermented beverage that has been traditionally consumed in China for over 2200 years. This ancient beverage is composed of two portions: a floating biofilm of cellulose and the sour liquid broth [4]. Several positive effects have been reported, including gastro protective effect of the culture broth and probiotic potential of the Kombucha microbiome [1,13]. In particular, in the culture broth the main metabolites identified are gluconic and glucuronic acids, glycerol, phenolic acids and caffeine; some are associated with beneficial effects on health. The two main classes of involved polyphenols are flavonoids and phenolic acids. Their chemical and structural modifications are due to biotransformation and metabolism by the kombucha consortium action, and have not been taken into account in previous studies of kombucha analogues obtained from other sources. The biotransformation of flavonoids has been a topic of research due to the interest in explaining the correlation between the beneficial properties of flavonoids and the structures of the active compounds. In Kombucha obtained from black tea, the

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Original research article

Comprehensive characterization by LC-DAD-MS/MS of the phenolic composition of seven *Quercus* leaf teas

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ABSTRACT

A complete characterization of the phenolic profile of leaves infusions from seven Mexican *Quercus* species was developed using different LC-DAD-MS/MS methodologies. The main families of phenolic compounds identified and quantified were: hydrolyzable tannins and flavonol glycosides, based on their fragmentation patterns and UV spectra, proanthocyanidins analyzed after acid-catalysis in the presence of phloroglucinol, and phenolic acids evaluated using UPLC-triple quadrupole mass spectrometer (QqQ). White oak species showed the largest amount of total phenols (830–2956 mg/L) with hydrolyzable tannins as the predominant group (60–96%), mainly vescavaloninic acid, vescalagin, and castalagin. Red species (total phenolics 129–280 mg/L), showing proanthocyanidins as the dominant family, consisted of units of catechin, gallocatechin and in less amount epicatechin gallate and epigallocatechin gallate and larger percentages of phenolic acids (10–19%).

1. Introduction

In recent years, the interest and consumption of herbal infusions (commonly called teas or tisanes) from a great diversity of edible plants has increased considerably among the Mexican population. These plant species include the genus *Quercus*, which has its diversification center in Mexico, because of 450 species estimated worldwide, about 135–150 are from this country, and 86 are considered endemic (Nixon, 1998; Zavala, 1998). Forty-one *Quercus* species (22 white and 19 red) occur in Durango forest. For many civilizations, local ethnic groups (Mixtecos, Tepehuanos, Totonacas and Tepehuas) have used *Quercus* species for medicinal and food purposes (Luna-José et al., 2003). The use of these herbal infusions as antioxidant nutraceuticals in traditional medicine is a common practice.

Recently, tisanes prepared with the leaves of Mexican *Quercus* species (*Q. resinosa, Q. sideroxyla, Q. eduardii* and *Q. durifolia*) have been reported to exhibit antioxidant activity (Rocha-Guzmán et al., 2012) as well as cardioprotective (Rivas-Arreola et al., 2010), anti-carcinogenic (Rocha-Guzmán et al., 2009), anti-inflammatory (Moreno-Jiménez et al., 2015), antimicrobial and anti-topoisomerase potential (Sánchez-Burgos et al., 2013). Antioxidant activity and inhibitory activity of key enzymes relevant for hyperglycemia and Alzheimeŕs disease were also observed in hydromethanolic and aqueous extracts of leaves of other *Quercus* species (Custodio et al., 2015; Haidi et al., 2017; Nugroho et al., 2016).

These biological activities are thought to be associated, at least in part, with the presence of phenolic compounds. Polyphenols, as a group of secondary metabolites broadly distributed in plant-derived products, have been shown to be responsible for many health benefits, including cardio-protective, anti-cancer, anti-diabetic, anti-aging and neuroprotective effects (Scalbert et al., 2005). Therefore, the characterization of polyphenols is of great importance, to confirm the potential health benefits attributed to *Quercus* teas.

From a phytochemical point of view, *Quercus* tree is very interesting because of the presence of different families of polyphenols. Different parts of the tree (wood, bark, cork, acorns) have been extensively investigated (Cantos et al., 2003; Castro-Vázquez et al., 2013; Fernandes et al., 2011; Fernández de Simón et al., 2006) due to their important role in the maturation of wines inside oak barrels, in the wood industry and human and animal nutrition (Haidi et al., 2017).

Bark and woods, mainly used in cooperages, are especially rich in ellagitannins (castalagin, vescalagin, grandinin and roburins A–E) and

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Nutritional characteristics and bioactive compound content of guava purees and their effect on biochemical markers of hyperglycemic and hypercholesterolemic rats

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ABSTRACT

The nutritional characteristics and bioactive compound content in purees elaborated with guava-strawberry, guava-blackberry, guava-soursop or guava-passion fruit were evaluated as well as their effect on biochemical markers of hyperglycemic and hypercholesterolemic rats. Over a 4-week period, the effects of each puree were examined. All purees presented a high content of indigestible fraction (70.6–82.3 g/100 g), vitamin C (500–534.6 mg/100 g), soluble polyphenols (32.8–33 mg/g) and antioxidant capacity. Several phenolic acids and flavonoids were identified. The addition of purees in the diet increased the body weight of hyperglycemic rats (~7%), but decreased the body weight of hypercholesterolemic rats (~15%). All the purees decreased the levels of plasma glucose, urea and creatinine in hyperglycemic rats, as well as the total cholesterol and triacylglycerol levels in hypercholesterolemic rats. The hepatic damage was reduced for all purees. These guava-purees represent a therapeutic alternative for individuals with diet-related diseases problems such as hyperglycemia and hypercholesterolemia.

1. Introduction

Noncommunicable diseases (NCDs) are defined as chronic diseases that are not transmitted from person to person. Alarmingly, these diseases are increasing worldwide, affecting all age groups (WHO, 2015). NCDs include obesity, hyperglycemia, hypercholesterolemia, hyperlipidemia, arteriosclerosis, diabetes mellitus (DM) type II, hypertension and other cardiovascular diseases (WHO, 2015). These metabolic disorders are known as a metabolic syndrome, which increases the morbidity and mortality that along with an increasingly aging society, creates a serious medical and socioeconomic problem (Elleuch et al., 2011). It is known that these pathologies decrease with the consumption of fresh fruits and vegetables due to the significant amounts of vitamins, minerals, dietary fibre, indigestible fraction and bioactive compounds that they have; which turn can control and prevent non-degenerative diseases. Moreover the diets that are rich in these vegetables may cause lower rates of mortality caused by NCDs (Elleuch et al., 2011).

Therefore many fruits and their components (stem, leaves, seeds and by-products) have been investigated to study their effects on health issues that include anti-hyperglycemic, hepatic steatosis, anti-inflammatory, anti-cancer, cardioprotective, anti-obesity, among others. The fruits that have been most studied are: guava (Huang, Yin, & Chiu, 2011; Liu, Wang, Hsieh, Lu, & Chiang, 2015), berries (Afrin et al., 2016; Aqil et al., 2016; Mazzoni et al., 2016), passion fruit (Kandandapani, Balaraman, & Ahamed, 2015) and soursop fruit (Coria-Téllez, Montalvo-Gónzalez, Yahia, & Obledo-Vázquez, 2016). These fruits are widely accepted by the consumers and are an important source of vitamin C, vitamin E, pigments (anthocyanins or carotenoids), dietary fibre (DF) and polyphenols (Huang et al., 2011; Meireles et al., 2015; USDA, 2011).

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Review article:

LUPANE-TYPE TRITERPENES AND THEIR ANTI-CANCER ACTIVITIES AGAINST MOST COMMON MALIGNANT TUMORS: A REVIEW

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ABSTRACT

In recent times, a great deal of interest has been motivated on plant derived compounds known as nutraceuticals. These compounds exert important beneficial activities that improve people's health status when are consumed regularly, and now they appear as a viable option to explore their possible therapeutic effects against diseases like cancer. Particularly, lupane-type triterpenes have shown great ability to modulate multiple cancer-related signaling pathways and processes, including NF-κB, Wnt/β-catenin, PI3K/Akt, apoptosis, and many other routes related to proliferation or cell death, which are uncontrolled in malignant tumors. These investigations have promoted *in vitro* and *in vivo* studies, searching their mechanisms of action; although more research is still needed to prove its potential in human clinical trials. This review focuses on the ability of betulin, betulinic acid and lupeol to show benefits against the most common types of malignant tumors, which are considered a major global threat for public health.

Keywords: lupeol, betulin, betulinic acid, cancer, signaling pathway

INTRODUCTION

In present times, non-communicable chronic diseases are responsible for about 63 % of deaths worldwide. This group includes diabetes mellitus (DM), cardiovascular diseases (CVD), chronic respiratory diseases (CRD) and cancer, being responsible for approximately 38 million of deaths per year; 75 % of these deaths (28 million) occur commonly in third world countries.

Cancer is a generic term that comprises a large number of diseases that affect distinct parts of the human body. It is characterised by uncontrolled cell growth, and is capable to disseminate to different tissues from where it was originated (metastasis), leading to people´s death. Cancer is responsible for

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Antioxidant and Angiotensin-Converting Enzyme Inhibitory Activity of *Eucalyptus camaldulensis* and *Litsea glaucescens* Infusions Fermented with Kombucha Consortium

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Summary

Physicochemical properties, consumer acceptance, antioxidant and angiotensin-converting enzyme (ACE) inhibitory activities of infusions and fermented beverages of *Eucalyptus camaldulensis* and *Litsea glaucescens* were compared. Among physicochemical parameters, only the pH of fermented beverages decreased compared with the unfermented infusions. No relevant changes were reported in consumer preference between infusions and fermented beverages. Phenolic profile measured by UPLC MS/MS analysis demonstrated significant concentration changes of these compounds in plant infusions and fermented beverages. Fermentation induced a decrease in the concentration required to stabilize 50 % of DPPH radical (*i.e.* lower IC_{50}). Additionally, it enhanced the antioxidant activity measured by the nitric oxide scavenging assay (14 % of *E. camaldulensis* and 49 % of *L. glaucescens*); whereas relevant improvements in the fermented beverage were not observed in the lipid oxidation assay compared with unfermented infusions. The same behaviour was observed in the inhibitory activity of ACE; however, both infusions and fermented beverages had lower IC_{50} than positive control (captopril). The present study demonstrated that fermentation has an influence on the concentration of phenolics and their potential bioactivity. *E. camaldulensis* and *L. glaucescens* can be considered as natural sources of biocompounds with antihypertensive potential used either as infusions or fermented beverages.

Key words: herbal infusions, fermented beverages, kombucha, antioxidant activity, polyphenols

Introduction

In recent years, the consumption of herbal infusions around the world has increased due to their beneficial health effects. These beverages are prepared by placing a small amount of the selected plant material in freshly boiled water, allowing the preparation to steep for a short period of time (*1*). Although herbal infusions do not have any particular nutritional value, they represent an important source of bioactive compounds such as polyphenols. It has been shown that these compounds can act by diverse mechanisms providing significant protection against chronic diseases (*2*). For example, the consumption of some herbal polyphenols with antioxidant activity may regulate hypertension through inhibition of the angiotensin-converting enzyme (ACE), a key component in the renin-angiotensin aldosterone system which regulates blood pressure (*3*).

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Effect of chemical stress on germination of cv Dalia bean (*Phaseolus vularis* L.) as an alternative to increase antioxidant and nutraceutical compounds in sprouts

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ABSTRACT

The aim of this study was to determine the effect of chitosan (CH), salicylic acid (SA) and hydrogen peroxide (H_2O_2) at different concentrations on the antinutritional and nutraceutical content, as well as the antioxidant capacity of bean sprouts (cv Dalia). All elicitors at medium and high concentrations reduced the antinutritional content of lectins (48%), trypsin inhibitor (57%), amylase inhibitor (49%) and phytic acid (56%). Sprouts treated with CH, SA and H_2O_2 (7 μM; 1 and 2 mM, and 30 mM respectively) increased the content of phenolic compounds (1.8-fold), total flavonoids (3-fold), saponins (1.8-fold) and antioxidant capacity (37%). Furthermore, the UPLC-ESI-MS/MS analysis showed an increase of several nutraceutical compounds in bean sprouts treated with SA such as coumaric (8.5-fold), salicylic (115-fold), gallic (25-fold) and caffeic (1.7-fold) acids, as well as epigallocatechin (63-fold), rutin (41-fold) and quercetin (16.6-fold) flavonoids. The application of elicitors in bean seed during sprouting enhances their nutraceutical properties.

1. Introduction

Common bean (*Phaseolus vulgaris* L.) is the most important legume worldwide, and is an excellent source of high quality proteins, as well as starch, dietary fiber, minerals and vitamins. Furthermore, beans are a rich source of bioactive compounds with several health benefits such as phenolic acids, flavonoids, non-digestible polysaccharides, saponins and phytosterols (Ramírez-Jiménez, Reynoso-Camacho, Tejero, León-Galván, & Loarca-Piña, 2015).

In addition, common bean has antinutritional compounds such as phytic acid, protease inhibitors (trypsin and chymotrypsin), α-amylase inhibitors and lectins, which decrease the bioavailability of trace elements, carbohydrates and proteins (Doria, Campion, Sparvoli, Tava, & Nielsen, 2012). Therefore, the inactivation or removal of these undesirable components is essential to improve the nutritional quality of common bean (Shimelis & Rakshit, 2007).

In recent years, the consumption of low-processed food has increased, and sprouting represents an effective process to improve the nutritional quality of legumes (Tang, Dong, Ren, Li, & He, 2014). Several studies have reported that common bean sprouts have higher levels of nutrients and a lower content of antinutrients as compared to dry seeds (López et al., 2013). Furthermore, phenolic composition and dietary fiber levels are enhanced during bean germination (Dueñas et al., 2016).

On the other hand, the application of exogenous elicitors, such as salicylic acid, during germination of common bean seeds enhances seedling growth and increases their content of total soluble phenolic compounds (Limón, Peñas, Martínez-Villaluenga, & Frias, 2014; Rivas-San Vicente & Plasencia, 2011). Similarly, it has

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Morphological and release characterization of nanoparticles formulated with poly (DL-lactide-co-glycolide) (PLGA) and lupeol: *In vitro* permeability and modulator effect on NF-κB in Caco-2 cell system stimulated with TNF-α

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ABSTRACT

Lupeol exhibits anti-inflammatory effects; unfortunately it shows low water solubility. An alternative to overcome this is the development of nanomaterials. Several methods for nanomaterial production are available. One of them is emulsification/solvent-evaporation. The objective of the present work was to evaluate physical properties, transport and *in vitro* modulator effects on NF-κB of poly (lactide-co-glycolide) (PLGA) nanoparticles loaded with lupeol. Nanonutraceuticals were prepared with 16% (w/v) of lupeol. Size distribution and morphology were measured by particle size analyzer and TEM. In vitro release of lupeol was studied by three different models: Higuchi, Siepmann & Peppas, and Power law. Transport of nanonutraceutical was studied in a Caco-2 cell model and by GC–MS. Modulator effect on NK-κB was studied by western blot analysis. Nanonutraceuticals were 10% larger than the nanoparticles without lupeol (372 vs 337 nm) and presented a broader size distribution (0.28 vs 0.22). TEM results displayed spherical structures with a broader size distribution. Entrapment efficiency of lupeol was 64.54% and it *in vitro* release data fitted well to the Power law and Higuchi equation ($R > 0.84–0.84$). Strong regulation of NF-κB of nanonutraceutical was observed. It was not observed any transport across the Caco-2 cell model at the different experimental conditions.

1. Introduction

Several natural compounds show biological effects, as the pentacyclic triterpenes. They are based on a 30-carbon skeleton comprising 5 six-membered rings (ursanes and lanostanes) or 4 six-membered rings and 1 five-membered ring (lupanes and hopanes) (Wal et al., 2011). They can be found in the balsam, and plant resins (Muffler et al., 2011); and usually in the diet, where a consumption of 250 mg per day is estimated for this compound (Saleem, 2009). One of them is lupeol, a lupane-type pentacyclic triterpene present in diverse plants such as Japanese pear, aloe leaf, mango pulp extract, ginseng oil, etc. (Siddique and Saleem, 2011).

Regarding to its anti-inflammatory effect, lupeol has shown inhibitory activities on pro-inflammatory cytokines such as IL-2, IFN-γ and TNF-α (Bani et al., 2006; Ahmad et al., 2010), IL-4, IL-5, eosinophils reduction (Vasconcelos et al., 2008) and effect against pro-inflammatory enzymes like iNOS and COX-2 (Saleem et al., 2004; Sánchez-Burgos et al., 2013).

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Isolation of lupeol from white oak leaves and its anti-inflammatory activity

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ABSTRACT

Lupeol [lup-20(29)-en-2-ol] is found mainly on the surface of plant barks, stems, leaves and fruits waxes. This research explored oaks leaves of several species (*Quercus resinosa*, *Q. grisea*, *Q. laeta* and *Q. obtusata*) as potential source of lupeol. It was extracted from *Quercus* leaves by maceration with $CHCl_3$ at 35 °C, followed by a purification in silica column (normal phase), and using as mobile phase hexane (100%), hexane:ethyl acetate (90:10) and hexane:ethyl acetate (80:20). Lupeol in oak leaves was identified by ^{13}C NMR and quantified by GC–MS. *Quercus obtusata* leaves were an abundant source of lupeol (173.59 μg/g of sample). Anti-cyclooxygenase activity has been used for determining bioactivity of lupeol in this research.

1. Introduction

Nutraceuticals are recognized as biologically active substances present in natural products and foods that when consumed in concentrated form have demonstrated beneficial effects on the health. Plants are the most commonly sources of natural bioactive compounds, which may specifically be helpful in the treatment of certain diseases. *Quercus* species commonly known as oaks have an important distribution in Mexico. Particularly the state of Durango, Mexico, possesses large forest areas with 41 *Quercus* species, from which 22 are whites and 19 are reds (Rosales-Castro et al., 2011). As reported, *Quercus* spp. leaves contain tannins, alkaloids, saponins, cardiac glycosides and steroids (Sánchez-Burgos et al., 2013), and have shown antioxidant, antimicrobial, antitopoisomerase and gastroprotective effects. Infusions of *Quercus* species has been used in folk medicine as treatment for several inflammatory diseases (Maxia et al., 2005).

Inflammatory diseases are one of the major problems in many pathophysiologies such as gastrointestinal disorders. There are many alternatives to treat inflammatory processes, some of which involve the use of nonsteroidal anti-inflammatory drugs (NSAIDs). However, the low enzymatic selectivity of these drugs and the abuse in their consumption cause health problems. This is due to the non-selective inhibition of NSAIDs on cyclooxygenase cytoquines. Therefore, it is justified to explore natural alternatives, which involve the use of bioactive nutraceuticals without side effects as the associated with the prolonged use of NSAIDs (Kumari and Kakkar, 2012).

Among the nutraceutical recognized with major biological potential as anti-inflammatory activity are triterpenes. Lupeol is a pentacyclic triterpene found in many medicinal plants and some fruits (Deyrup et al., 2014; Hernández-Vázquez et al., 2010). This chemical constituent has shown diverse biological effects such as: antioxidant, anti-topoisomerase, antitumor, anti-inflammatory, among other activities (Santiago and Mayor, 2014; Zhang et al., 2015; Kumari and Kakkar, 2012).

Lupeol is distributed along the plant kingdom, and is found in olive fruit, mango fruit, Aloe leaves, Elm Plant, Japanese pear, Ginseng oil (Saleem, 2009) and fig (Santiago and Mayor, 2014) among others, in concentrations between 3 and 880 μg/g of sample. Considering the health benefits that this triterpene provides, the main objective of the present work was to explore new natural sources to

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Gastroprotective potential of *Buddleja scordioides* Kunth Scrophulariaceae infusions; effects into the modulation of antioxidant enzymes and inflammation markers in an in vivo model

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ABSTRACT

Ethnopharmacological relevance: A common plant used to treat several gastric disorders is *Buddleja scordioides* Kunth, commonly known as salvilla.
Aim of the study: To detect inflammatory markers, in order to evaluate the gastroprotective potential of salvilla infusions, as this could have beneficial impact on the population exposed to gastric ulcers and colitis.
Materials and methods: The present work attempted infusions were prepared with *B. scordioides* (1% w/w) lyophilized and stored. Total phenolic content and GC–MS analysis were performed. Wistar rats were divided into five groups ($n=8$), a negative vehicle control, an indomethacin group, and three experimental groups, named preventive, curative, and suppressive. All rats were sacrificed under deep ether anesthesia (6 h) after the last oral administration of indomethacin/infusion. The rat stomachs were promptly excised, weighed, and chilled in ice-cold and 0.9% NaCl. Histological analysis, nitrites quantification and immunodetection assays were done.
Results: B. scordioides infusions markedly reduced the visible hemorrhagic lesions induced by indomethacin in rat stomachs, also showed down-regulation of COX2, IL-8 and TNFα and up-regulation of COX-1 with a moderate down-regulation of NFkB and lower amount of nitrites. However, this behavior was dependent on the treatment, showing most down-regulation of COX-2, TNFα and IL-8 in the curative treatment; more down-regulation of NF-kB in the preventive treatment; and more up-regulation of COX-1 for the suppressor and preventive treatments.
Conclusion: The anti-inflammatory potential of *B. scordioides* infusions could be related with the presence of polyphenols as quercetin in the infusion and how this one is consumed.

1. Introduction

Gastric ulcer is a recurrent chronic illness that affects approximately 10% of the world population (Zapata-Colindres et al., 2006). A peptic ulcer is an erosion or mucosal injury in the stomach (gastric ulcers) or in the upper small intestine (duodenal ulcers). Gastrointestinal ulcers are one of the most common diseases of man and can lead to cancer. Gastric ulcer is caused by varieties of both endogenous and exogenous factors, which include acid conditions, pepsin, stress and noxious agents such as alcohol, non-steroidal anti-inflammatory drugs (NSAID), *Helicobacter pylori* bacteria, smoking and alcohol consumption (Syam et al., 2009). Those factors tend to generate free radicals (ROS), which can be related with several health diseases.

Indomethacin is a non-selective non-steroidal anti-inflammatory drug (NSAID) that carries warnings to adults, when prescribed orally for rheumatoid and osteoarthritis. Its toxicity to the gastrointestinal tract namely the induction of bleeding, ulcerations and perforation of stomach or intestines, may be fatal. This serious

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Effect of stevia and citric acid on the stability of phenolic compounds and *in vitro* antioxidant and antidiabetic capacity of a roselle (*Hibiscus sabdariffa* L.) beverage

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ABSTRACT

Plant infusions are consumed due to their beneficial effects on health, which is attributed to their bioactive compounds content. However, these compounds are susceptible to degradation during processing and storage. The objective of this research was to evaluate the effect of stevia and citric acid on the stability of phenolic compounds, antioxidant capacity and carbohydrate-hydrolysing enzyme inhibitory activity of roselle beverages during storage. The optimum extraction conditions of roselle polyphenolic compounds was of 95 °C/60 min, which was obtained by a second order experimental design. The incorporation of stevia increased the stability of colour and some polyphenols, such as quercetin, gallic acid and rosmarinic acid, during storage. In addition, stevia decreased the loss of ABTS, DPPH scavenging activity and α-amylase inhibitory capacity, whereas the incorporation of citric acid showed no effect. These results may contribute to the improvement of technological processes for the elaboration of hypocaloric and functional beverages.

1. Introduction

The interest of consumers for food products that may be used to promote health has led to an increase on the formulation and commercialisation of tea-based drinks, which may be rich in phytochemicals, and have properties that may reduce the risk of diseases, such as obesity, diabetes, cardiovascular and neurodegenerative diseases, and cancer (Pandey & Rizvi, 2009). The metabolic alterations associated with diabetes can be controlled through the reduction of hyperglycaemia, by means of the inhibition of intestinal enzymes related with carbohydrate degradation, such as α-amylase and α-glucosidase (Sales, Monteiro, Simeoni, Oliveira, & Silveira, 2012), along with the reduction of oxidative stress (Elsayed, 2001).

Roselle flowers (*Hibiscus sabdariffa* L.) are used in Mexico to produce a deep red-coloured drink, obtained by thermally treating dehydrated calyxes, yielding a polyphenolic-rich beverage with antioxidant, antiinflammatory and antidiabetic properties (González-Stuart, 2011). However, the bioactive compounds found in roselle, such as flavonoids and anthocyanins, are unstable and may be degraded during the preparation of a beverage, forming colourless or brown-coloured products, with a further loss of most of their beneficial health properties (Domínguez-López, Remondetto, & Salvador, 2008).

Therefore, studies have been undertaken to evaluate the detrimental effect of processing and storage on anthocyanin stability. The use of low temperatures during extraction (Cissé, Vaillant, Kane, Ndiaye, & Dornier, 2011) and storage (Turker, Aksay, & Ekiz, 2004), as well as protection from light (Song et al, 2013) have proved to be favourable for pigment protection. Recently, the effect of additives, such as food-grade organic acids and sweeteners, have been evaluated. A recent study evaluated the effect of various organic acids on colour retention during storage, and found that acetic acid improved colour stability in both elderberry and black currant juices, whilst the incorporation of citric and tartaric acids only improved this parameter in elderberry juice. (Hubbermann,

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CHEMICAL COMPOSITION OF BIOMASS GENERATED IN THE GUAVA TREE PRUNING

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ABSTRACT

Psidium guajava L. (*Myrtaceae*) is a native plant of Central America and is now widely cultivated in many tropical regions of the world for the fruit production. In Mexico, in the guava orchards common practices to control fruit production are: water stress, defoliation and pruning. In this study, we report the chemical composition of the biomass (branches and leaves) generated in the pruning practices. The results ranged as follows: pH (4.98-5.88), soda solubility (39.01-70.49 %), ash (1.87-8.20 %); potassium and calcium were the major inorganic elements in ash. No heavy metals were detected in the studied samples; total solubility (15.21-46.60 %), Runkel lignin (17.77-35.26 %), holocellulose (26.56 -69.49 %), α-cellulose (15.53-35.36 %), hemicelluloses (11.02-34.12 %), tannins in aqueous extracts (3.81-9.06 %), and tannins in ethanolic extracts (3.42-15.24 %).

Keywords: *Psidium guajava*, pH, ash, extractives, polysaccharide, tannins

INTRODUCTION

Psidium guajava L. belongs to the *Myrtaceae* family. It is a native of Central America but is now widely cultivated, distributed and the fruits enrich the diets of millions of people in the world tropics (Rathish and Sumitra, 2007; El-Mahmood, 2009). In Mexico, the States with the largest fruit production are Michoacan (42 %), Aguascalientes (35 %) and Zacatecas (15 %), the rest (8 %) belongs to other states (González Gaona et al., 2002). In Michoacan, the maximum fruit production falls into three municipalities located in the eastern area of the state: Jungapeo (2,500 hectares), Benito Juárez (1,500 hectares) and Zitácuaro (1,000 hectares) (Mendoza Lopez et al., 2005). In these guava orchards common practices to control fruit production are: water stress, defoliation and pruning; pruning is the most used activity.

P. guajava is a well known traditional medicinal plant used in some indigenous systems throughout the world. All parts of this tree, including roots, bark, leaves, seeds, and the fruits have been used for treatment gastrointestinal problems. Leaves, pulp and seeds are used as an antispasdomic, anti-inflammatory, and anti-diarrheic, to treat

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Article

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Metabolite Profile, Antioxidant Capacity, and Inhibition of Digestive Enzymes in Infusions of Peppermint (*Mentha piperita*) Grown under Drought Stress

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ABSTRACT: Peppermint (*Mentha piperita*) infusions represent an important source of antioxidants, which can be enhanced by inducing abiotic stress in plants. The aim of this study was to evaluate the effect of drought stress on peppermint cultivation as well as the metabolite profile, antioxidant capacity, and inhibition of digestive enzymes of resulting infusions. At 45 days after planting, irrigation was suppressed until 85 (control), 65, 35, 24, and 12% soil moisture (SM) was reached. The results showed that 35, 24, and 12% SM decreased fresh (20%) and dry (5%) weight. The 35 and 24% SM treatments significantly increased total phenolic and flavonoid contents as well as antioxidant capacity. Coumaric acid, quercetin, luteolin, and naringenin were detected only in some drought treatments; however, in these infusions, fewer amino acids and unsaturated fatty acids were identified. The 24 and 12% SM treatments slightly improved inhibition of pancreatic lipase and α-amylase activity. Therefore, induction of moderate water stress in peppermint is recommended to enhance its biological properties.

KEYWORDS: *peppermint infusion, drought stress, phenolic compounds, antioxidant capacity, inhibition of enzyme activity*

INTRODUCTION

Herbal infusions are widely consumed because of the phenolic compounds that they contain. These compounds are considered the most abundant natural antioxidants in food and are recommended for inclusion in the diet because of the health benefits that they can produce. One of the most popular herbal preparations is peppermint (*Mentha piperita*) infusion. This plant has a phenolic compound content in leaves of approximately 19−23% dry weight, of which 12% are flavonoids, such as eriocitrin, rosmarinic acid, hesperidin, and luteolin.[1] Approximately 75% of these compounds can be extracted in the preparation of an infusion, and many of them have been shown to have antioxidant, hypolipidemic, antidiabetic, and antitumoral properties.[2,3] Other important components found in peppermint leaves are fatty acids, volatile compounds, chlorophyll, α- and γ-tocopherols, and ascorbic acid.[1]

Several studies have demonstrated that peppermint extracts decrease glucose, total cholesterol, triacylglycerols, very low-density lipoprotein (VLDL), and low-density lipoprotein (LDL) levels, thus decreasing the atherogenic index in diabetic rats.[4,5] These health benefits can be enhanced using preharvest strategies to increase bioactive compounds in the peppermint leaves. In a wide variety of plant species, deficit irrigation has been shown to enhance the synthesis of several phytochemicals, including phenolic acids, flavonoids, and tannins, as a response to stress constraints.[6] Under stress conditions, increased reactive oxygen species (ROS) production is observed in different cellular compartments, leading to the activation of the antioxidant system, which synthesizes phenolic compounds. Nevertheless, the use of drought stress as a strategy to improve phytochemicals in plants should be carefully applied to avoid the detrimental effects of excessive ROS production, such as cellular damage and death.[7] Therefore, the aim of this study was to cultivate peppermint (*M. piperita*) at different levels of drought stress and to evaluate the effect on plant growth as well as on the metabolite profile, antioxidant capacity, and inhibitory activity on digestive enzymes of resulting infusions.

MATERIALS AND METHODS

Reagents and Biological Materials. The peppermint plants were purchased from a local plant nursery, Floraplant S.A. de C.V. (Mexico) and taxonomically identified in the herbarium "Dr. Jerzy Rzedowski" of the Natural Science Department of Universidad Autónoma de Queretaro. 1,1-Diphenyl-2-picrylhydrazyl radical, 2,20-azinobis(3-ethylbenzthiazoline-6-sulfonic acid), sodium nitroprusside, lipase from porcine pancreas (type II), 4-nitrophenyl butyrate, α-amylase, *p*-nitrophenyl-α-D-glucopyranoside, α-glucosidase, caffeic, coumaric, sinapic, and rosmarinic acids, eriocitrin, naringenin, rutin, vanillin, luteolin, quercetin, and hesperidin were purchased from Sigma-Aldrich (St. Louis, MO).

Plant Growth Conditions and Measurement of Growth Parameters. The plants were grown in a greenhouse at the Universidad Autónoma de Queretaro in pots with a diameter of 40 cm, with irrigation every 3 days [85% soil moisture (SM)] during the first 45 days. Mean daily temperature inside the greenhouse was within optimal ranges for peppermint growth (19−25 °C).[1] Fertilization was

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Effect of chemical elicitors on peppermint (*Mentha piperita*) plants and their impact on the metabolite profile and antioxidant capacity of resulting infusions

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ABSTRACT

Infusions are widely consumed all over the world and are a source of dietary antioxidants, which can be improved in plants using elicitors. The aim of this study was to evaluate the foliar application of salicylic acid (SA) (0.5, 1 and 2 mM) or hydrogen peroxide (H_2O_2) (0.05, 0.1 and 0.5 mM) on peppermint (*Mentha piperita*) plants and its effect on the metabolite profile and antioxidant capacity of resulting infusions. Whereas 2 mM SA treatment improved plant growth parameters and metabolite profile (carbohydrates and amino acids), 0.5 and 1 mM SA treatments increased phenolic compound concentration. Sinapic acid, rutin and naringin were detected only in SA treatments; antioxidant capacity was also improved. Regarding H_2O_2 treatments, no differences in plant growth parameters, metabolite profile or antioxidant capacity were found. Therefore, the application of SA to peppermint is recommended in order to improve bioactive compounds and the antioxidant capacity of infusions.

1. Introduction

Herbal infusions are aromatic beverages prepared by pouring hot or boiling water over dry parts of plants. These infusions are some of the most widely consumed beverages in the world, providing a major source of dietary phenolic compounds, which are considered the most abundant natural antioxidants. In Mexico, approximately 80% of the population consumes infusions on a regular basis, and one of the most popular is prepared from peppermint (*Mentha piperita*) (Rivera et al., 2008).

Among the major components found in peppermint leaves are fatty acids such as linoleic, linolenic and palmitic acid. A variety of volatile compounds, mainly menthol, menthone and isomenthone have also been identified along with β-carotene, chlorophyll, α- and γ-tocopherols and ascorbic acid. Other important compounds found in peppermint are phenolic compounds. The proportion of phenolic compounds found in peppermint leaves is approximately 19–23% dry weight, of which 12% belongs to the flavonoids group, including eriocitrin, rosmarinic acid, hesperidin and luteolin 7-O-rutinoside, among others. 75 percent of these compounds can be extracted in an infusion (McKay & Blumberg, 2006). It has been reported that flavonoids exert many beneficial effects on health which is linked to their known biological functions as antioxidants, due to their free radical scavenging and metal chelating properties (Pawlak et al., 2010).

Phenolic compounds are involved in various plant processes such as growth and reproduction and are also synthesized as a defence mechanism against biotic or abiotic stress (Cohen & Kennedy, 2010); therefore, their production can be enhanced by treatment with certain compounds, termed elicitors, which are defined as a substance that, when introduced in small concentrations to a living system, initiates or improves the biosynthesis of specific compounds (Edreva et al., 2008; Ferrari, 2010). Salicylic acid (SA) is a phenolic compound that shows great potential as an elicitor in plants. It occurs naturally in plants in small amounts and participates in the regulation of physiological processes such as stomatal closure, nutrient uptake, chlorophyll and protein synthesis, transpiration and photosynthesis (Raskin, 1992). Low concentrations of exogenously applied SA interact with stress-signalling mechanisms and induce phenolic compound synthesis (Gharib, 2007; Ghasemzadeh & Jaafar, 2012; Khandaker, Akond, & Oba, 2011). Catalase and ascorbate peroxidase are the main enzymes involved in the removal of H_2O_2 in plants and their activities can be

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Original Research

Chemical and sensory evaluation of a functional beverage obtained from infusions of oak leaves (*Quercus resinosa*) inoculated with the kombucha consortium under different processing conditions

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Abstract

The potential use of non-timber products as alternative sources of functional beverages such as kombucha analogues was evaluated. The fermentation of sweetened oak herbal infusions (*Quercus resinosa*) with the kombucha consortium was explored. The following conditions of the fermentation process induced by the action of the kombucha consortium were assessed: sensory acceptability and pH, colour and chemical changes (phenolic composition). The chemical analysis showed the presence of hydroxybenzoic and hydroxycinnamic acid derivatives, flavonoids, flavonols and flavanones, which are related to the antioxidant capacity of the product obtained. The metabolic consumption of flavan-3-ols and hydroxybenzoic acid derivatives as well as the production of organic acids (succinic acid) has decreased the astringency and bitterness, improving the product's quality and acceptability. Fermentation with the kombucha consortium significantly increased the product's acceptability (up to 5 units) and decreased its pH (2 units).

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Introduction

Kombucha is a popular beverage that originated in Northeast China or Manchuria and then spread to Russia, Germany and the rest of the world [1]. Kombucha tea is an effervescent and sour drink that is a product of the biotransformation of sweetened black tea (*Camellia sinensis*) by means of the symbiotic action of a consortium formed by acetic acid bacteria (*Bacterium xylinum*, *B. xylinoides*, *B. gluconicum*, among others) and yeasts (*Saccharomyces ludwigii*, *S. apiculatus varieties*, *Schizosaccharomyces pombe*, among others) [2]. The symbiosis of the kombucha consortium may vary depending on geographic and climatic conditions as well as on the local species of wild yeasts and bacteria [3].

The fermentation process involves the activity of yeasts that ferment glucose and fructose to ethanol, which is then oxidised to acetic acid by acetic acid bacteria. The main source of carbon in this process is sucrose. The sugar is hydrolysed by the enzyme invertase from yeast present in the kombucha consortium, producing ethanol via the metabolic pathway of glycolysis, with a preference for fructose as the substrate. Subsequently, acetic bacteria convert

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Antioxidant, antimicrobial, antitopoisomerase and gastroprotective effect of herbal infusions from four *Quercus* species

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ABSTRACT

Leaves from four species of white oaks (*Quercus resinosa*, *Quercus laeta*, *Quercus grisea*, and *Quercus obtusata*) were investigated for the evaluation and comparison of their antioxidant, antimicrobial, anti-topoisomerase, and anti-proliferative activities. DPPH and hydroxyl radical scavenging capacities were tested *in vitro*. Results indicated that aqueous extracts from leaves of *Quercus laeta* and *Q. grisea* displayed higher radical scavenging activity, while extracts from *Q. grisea* and *Q. obtusata* were more efficient in inhibiting the degradation of deoxyribose, preventing the formation of hydroxyl radicals. Polar extracts showed different degrees of antimicrobial activity, presenting *Q. resinosa* leaves a broader spectrum. In the anti-topoisomerase assay only *Q. resinosa* leaves infusions showed activity. The investigation indicates that the biological activity of aqueous extracts from oak leaves promises a more rational and effective application of this resource in the near future.

1. Introduction

Quercus trees, commonly known as oaks, belong to the family Fagaceae. They comprise 450 species worldwide, with an important distribution in Mexico, where are present 135–150 species, 86 of them are considered endemic (Luna-José et al., 2003). The state of Durango, Mexico, possesses extent woodland resources covered by template species mainly represented by mixed pine and oaks forests (Corral and Navar Chaidez, 2005). In Durango, Mexico forests inhabit 41 *Quercus* species, from which 22 are white and 19 are red (Rosales-Castro et al., 2011).

Research on natural products with potential therapeutic benefits represents an area of great interest in which herbal products had been the most important source. Phytochemical compounds allow us to understand plant physiology and biochemical pathways and propose a sustainable handling for each particular product. This potential source for non-timber products, including nutraceutical ingredients, has not been explored.

In Mexican traditional medicine the use of plants on the form of infusion or plasters is a common practice. Chemoprevention with dietary substances is an important area of research and entails using non-toxic substances to interfere with carcinogenesis (Johnson et al., 2010). There are worldwide efforts to discover anticancer agents from plants (Demain and Vaishnav, 2011). Some phytochemicals as ellagitanins (type of polyphenols) have shown antioxidant, gastroprotective (Beserra et al., 2011) and anticancer properties (Umesalma and Sudhandiran, 2011).

Several methods have been proposed to link biochemical mechanism to carcinogenesis (Shureiqi et al., 2000). An example is topoisomerase inhibitors which constitute a class of agents that inhibit carcinogenesis *via* their antiproliferative or cell-differentiating action and are considered an attractive targeting strategy in chemotherapy and chemoprevention (Cho et al., 2000).

The aim of this work was to investigate the *in vitro* antioxidant, antitopoisomerase, antimicrobial, anticiclooxigenase and antiproliferative activities of herbal infusions (teas) from the leaves of *Quercus resinosa*, *Quercus grisea*, *Quercus laeta* and *Quercus obtusata*.

2. Material and methods

2.1. Biological material

Saccharomyces cerevisiae mutant cells JN362a, JN394, JN394 t_{-1}, JN394t_{2-4} and JN394t_{2-5} were kindly provided by Dr. John Nitiss of St. Jude Children's Research Hospital, Memphis, TN, USA. Standard

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Full Length Research Paper

Polyphenolic content and antioxidant activity of leaf extracts from *Quercus durifolia, Quercus eduardii, Quercus sideroxyla* and *Quercus resinosa*

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The phenolic content and antioxidant activities of extracts from *Quercus durifolia, Quercus resinosa, Quercus eduardii* and *Quercus sideroxyla* leaves were studied. Extracts were obtained by successive extraction with aqueous acetone (70%) followed by methanol (50%). Antioxidant activities were determined using a single electron transfer (SET) and hydrogen atom transfer (HAT) based assays. For SET-based the assays performed were, 2,2-diphenyl-1-picryl hydrazine (DPPH) inhibition expressed as IC_{50}, redox potential, as mV, inhibition of the low density lipoprotein (LDL) oxidation, as % of inhibition. For HAT-based assay, crocin bleaching technique was applied; a kinetics approach was used for the evaluation of total antioxidant capacity and the results presented in terms of equivalence by weight of a reference antioxidant. Acetone extracts (PFQA) from leaves of all *Quercus* species showed the best antioxidant capacity. *Q. resinosa* (PFQr) exhibited the best antioxidant capacity among the *Quercus* species analyzed either in acetone or methanol extracts (PFQM). Distinctive results are: DPPH IC_{50}, PFQrA = 78.3 µg/g, PFQrM = 250.7 µg/g; In Redox potential, PFQrA = 147.0 mV, PFQrM = 201.6 mV; In LDL oxidation inhibition: 98.2% and in inhibition of crocin bleaching, PFQrA = 1.08 g, PFQrM = 0.98 g. In conclusion, *Quercus* leaves might be used as potential source of polyphenolic antioxidants.

Key words: *Quercus sp.*, SET-based assay, HAT-based assay, phenolic compounds, antioxidant activity.

INTRODUCTION

On recent times the use of plants, vegetables, herbs and spices used in folk and traditional medicine have gained a wide acceptance as an important source for new chemicals discovery (Afolayan et al., 2008). Currently, there is an increased interest for new sources of compounds with evidenced biological activity, among which are natural antioxidants. These compounds can prevent the damage to macromolecules and cells by interfering with free radicals, usually implicated in the etiology of several diseases such as atherosclerosis,

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Evaluation of culinary quality and antioxidant capacity for Mexican common beans (*Phaseolus vulgaris* L.) canned in pilot plant

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Abstract

Common beans are rich in bioactive phytochemicals such as polyphenolic compounds. Unfortunately, they need to be thermally processed to be consumed. The health benefits related to common beans comsumption depends mainly on their thermal processing. The objective of this work was to evaluate the effect of thermal processes on the antioxidant capacity and industrial quality of four Mexican common beans cultivars (Black bean 8025, Pinto Saltillo, Pinto Durango, and Bayo Victoria). The common beans were thermally processed by two methods: sterilization (canning), and open pan cooking. Optimal cooking time and Fo parameter (Defined as being equivalent, in sterilizing capacity, to the cumulative lethal effect of all time/temperature combinations experienced at the slowest heating point) were obtained for each cultivar. Grain size, water absorption capacity (WAC), oil absorption capacity, integrity and color were the physical parameter evaluated. Chemical parameters analyzed were total phenolic content (TPC), and DPPH radical scavenging activity. Bayo beans showed biggest size, Pinto beans, medium size, and Black beans, the smallest size. Lowest optimal cooking time (open pan) was observed in Pinto Saltillo cultivar. Lowest Fo parameter of the container during the thermal process was observed for Bayo Victoria cultivar. Higher WAC values were observed in Bayo Victoria and Black bean cultivar (open and canned). Higher value of integrity was found for Bayo Victoria beans. After any thermal processing L^* value was lower in all cultivars. Higher values of TPC in cooked common beans cultivars were observed in Black beans and Bayo Victoria cultivars. Lower IC_{50} value in DPPH test was observed in canned Black beans and Bayo Victoria cultivars.

Introduction

Common edible beans (*Phaseolus vulgaris* L.) are one of the basic foods in Africa, India, and Latin America. Pinto beans are preferred in the North of Mexico and the Southwestern of United States, while Central and South of Mexico, Central America and South America eat mostly colored beans (including black beans). Common bean is a legume considered a functional food because it contains bioactive phytochemicals, such as polyphenols and tannins, which show antioxidant capacity (Dueñas *et al*., 2005; Oomah *et al*., 2005).

In vitro antioxidant activities and phenolic compounds in raw (unprocessed) pinto and black beans, yellow and black soybeans have been reported in several studies (Madhujith *et al*., 2004; Oomah *et al*., 2005; Xu and Chang, 2007). They indicate that common beans may serve as an excellent dietary source of natural antioxidants for disease prevention and health promotion. However, the health-promoting capacities of common beans could depend on their

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The influence of different time durations of thermal processing on berries quality☆

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ABSTRACT

Bioactive compounds (polyphenols, flavonoids, flavanols, tannins, anthocyanins and ascorbic acid) and the level of antioxidant activity by ABTS, DPPH, FRAP and CUPRAC of water, acetone and hexane extracts of Chilean 'Murtilla' (*Ugni molinae* Turcz) and 'Myrteola' berries (Myrtaceae, *Myrteola nummularia* (Poiret) Berg.), Chilean and Polish blueberries (*Vaccinium corymbosum*), Chilean raspberries (*Rubus idaeus*), and Polish black chokeberry (*Aronia melanocarpa*) were determined and compared. It was found that the contents of the bioactive compounds and the levels of antioxidant activities in used extracts differ significantly ($P < 0.05$). The correlation between the total polyphenols, flavanols and the antioxidant activities was significantly the highest in water, average in acetone and the lowest in hexane extracts. Fourier transform infrared (FTIR) spectroscopy was applied as an additional tool for the characterization of the water polyphenol extracts. Aqueous extracts of investigated berries were subjected to different times of thermal processing. Bioactive compounds and the levels of antioxidant activities by 2,2-Azino-bis (3-ethyl-benzothiazoline-6-sulfonic acid) diammonium salt ($ABTS^{+}$); 1,1-Diphenyl-2-picrylhydrazyl method (DPPH); Ferric-reducing/antioxidant power (FRAP) and Cupric reducing antioxidant capacity (CUPRAC) after 10, 20, 40 and 60 min of thermal processing were determined and compared with non processed samples. It was found that the antioxidant activity only of berries subjected to thermal processing for 10 and 20 min did not differ from the non thermally processed studied berries, showing high correlation between the total polyphenols, flavanols and the antioxidant activities. In conclusion, thermal treatment of studied berries influences their quality: only berries after 10 and 20 min of thermal processing preserved their bioactivity.

1. Introduction

Polyphenolic compounds, which present in berries, fruits and vegetables important not only in terms of quality, as they influence the visual appearance and taste, but also from a therapeutical point of view, as they appear to be associated with the prevention of different diseases (Arancibia-Avila et al., 2011; Borowska & Mazur, 2008; Fredes, 2009; Gorinstein et al., 2009; Piasek et al., 2011).

The bioactive nutrients and antioxidants present in fruits and berries are responsible for their perception as healthy foods (Dean, Leavens, & Boyd, 2010). Lugasi, Hovari, Kadar, and Denes (2011) determined phenolics in raspberry, blackberry and currant cultivars. Two cultivars of conventionally and organically grown red raspberries and blueberries were analyzed for total anthocyanins, total and specific phenolic compounds and total antioxidant activity (Sablani et al., 2010). From a big number of cited references above it can be concluded that the subject of different berries was investigated intensively. Chilean berries were also studied (Fredes, 2009). We were interested to investigate a new kind of Chilean berry known by the name of 'Myrteola' and to compare its composition with the wide consumed berries, which was described in our recent report (Arancibia-Avila et al., 2011).

☆ This research is dedicated to the memory of Prof. Simon Trakhtenberg, who encouraged and supported our research group during all his life.

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Chemical Evaluation, Antioxidant Capacity, and Consumer Acceptance of Several Oak Infusions

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Abstract: As part of an ongoing screening on natural products, 4 oak leaves were analyzed as potential nutraceutical beverages. The phenolic composition, antioxidant capacity, and sensory preferences of leaves infusions from *Quercus resinosa*, *Q. sideroxyla*, *Q. eduadii*, and *Q. durifolia* in comparison with 2 commercial green teas were investigated. Herbal infusions from oak leaves and Green teas (1%, 80 °C, 10 min) were evaluated for total polyphenol content (TPC), total flavonoid content (TFC), HPLC analysis, trolox equivalent antioxidant capacity (TEAC), oxygen radical absorbance capacity (ORAC), soluble solids, pH, color, and consumer preference analysis. *Q. resinosa* leaves infusions have shown the highest TPC, TEAC, and ORAC values but they have attained the lowest preference score. *Quercus* leaves infusions with higher content of gallic acid and catechins showed best antioxidant capacity but lower consumer preference.

Keywords: antioxidant capacity, beverages, consumer preference, herbal infusions, polyphenols, Quercus

Introduction

Plants, vegetables, and herbs used in traditional medicine have gained a wide acceptance as the major sources of prophylactic phytochemicals discovery. For this reason, information on the overall antioxidant properties of natural products is becoming relevant in the fields of nutrition and nutraceuticals development. Infusions contain many compounds, especially flavonoids, which are a large family of plant phenolics widely distributed in vegetables and natural beverages, such as tea. Main flavonoids found in fresh green tea are the catechins, particularly, (-)-epicatechin, (-)-epicatechin-3-gallate (ECg), (-)-epigallocatechin, and (-)-epigallocatechi-3-gallate (EGCg; Crespy and Williamson 2004). Phenolic compounds have been considered to be health-promoting components in plants-derived beverages.

The biological activity of polyphenols is mainly connected with their high antioxidant and antiradical potentials as deduced from a variety of biochemical methods. Antioxidants are substances that delay the oxidation process, inhibiting chain reaction initiated by free radicals, and playing an important role in chemoprevention (Tachakittirungrod and others 2007). Its potential antioxidant relevance is reflected in the values obtained with several assays, as the trolox equivalent antioxidant capacity (TEAC) assay among another assays.

In recent years, there has been a considerable interest in finding natural antioxidants from plants materials; the botanical kingdom offers practically interminable opportunities to find new functional ingredients for beverages. These beverages are accompanied by claims and attention on "lifestyle," positioning products for stimulation, relaxation, or health promotion. New functional beverages, like fortified water and tea, have increased their convenience, novelty, fun, and image but maintain their status as healthy drinks (Gruenwald 2009). Positioning new products in the market requires some measures of whether the products are liked or not. Researchers have developed instruments to measure food-related attitudes to better understand how health- and nonhealthy related factors influence dietary choices. Steptoe and others (1995) introduced a multidimensional measure of the motive related to food choice, including 9-labeled factors, such as health, sensory appeal, mood, convenience, natural content, price, weight control, familiarity, and ethical concern (Kolodinsky and others 2008).

Acceptance testing is a valuable and necessary component of the research and development process of new food products. By acceptance testing we mean measuring liking or preference for a product. There is an obvious and direct relationship between measuring product liking/acceptance in multiproduct test and from these data to determine preference (Stone and Sidel 2004). A method that produces a rank order and a measure of the distances between ranks is an acceptable substitute for hedonic scaling, because it would give the same information. This idea has been exploited when measuring preferences for various foods, beverages, and personal products (Lee and O'Mahony 2005).

Durango, México, with 39 species of *Quercus,* has an important forestry resource that is not always totally exploited. Different uses have been recorded for several species of oaks, such as food. There is a relationship between ethnic groups and the use of oaks in a given region, indicating the cultural value as a complementary plant resource in addition to their importance as woody species (Luna and others 2003). In Asian countries, the galls of *Quercus infectoria* have been used for centuries in the oriental traditional medicine for treating inflammatory diseases; in this context, Kaur and others (2004) suggest that alcoholic extract of oak galls exerts *in vivo* anti-inflammatory activity after oral or topical administration

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Monterrey, N.L. a 10. de octubre de 2014

Dra. Nuria Elizabeth Rocha Guzmán
Profesora del Instituto Tecnológico de Durango
Presente

Estimada Dra. Rocha,

Por este conducto quisiera expresarle mi agradecimiento y reconocimiento por haber impartido dos conferencias sobre ***Bebidas Funcionales Fermentadas*** a los estudiantes del Tecnológico de Monterrey Campus Monterrey que cursan el Posgrado de Biotecnología y la carrera de Ingeniero en Biotecnología. Su participación ha sido muy valiosa y considero que será de gran utilidad para los estudiantes ya que pudieron enterarse sobre las tendencias en investigación y desarrollo de bebidas funcionales.

Así mismo, considero que su visita nos ha dado la oportunidad de encontrar temas en los que podemos realizar investigación conjunta en el corto plazo.

Sin otro particular por el momento, quedo de Usted

Atentamente

Dra. Aurora Valdez Fragoso

INSTITUTO TECNOLOGICO
DE DURANGO
Vo. Bo.
Ing. Jesús Astorga Perez
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Otorga el presente

Reconocimiento

A:

Dra. Nuria Elizabeth Rocha Guzmán

Por la presentación de la conferencia
"Fuentes Innovadoras de Bebidas Funcionales" y
Por su destacada participación en el

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"La Técnica al Servicio de la Patria"

Ing. Jesús Astorga Pérez
Director

SEP INSTITUTO TECNOLÓGICO de Durango
DIRECCIÓN

Facultad de Ciencias Químicas

FACULTAD DE CIENCIAS QUIMICAS
UJED

U.J.E.D.

Otorga la presente

Constancia

A la Dra. Nuria E. Rocha Guzmán

Por haber impartido la ponencia "Bebidas funcionales fermentadas de encino y su potencial biológico" dentro de la semana académica 2015 en la Facultad de Ciencias Químicas.

" Por mi Raza hablará el Espíritu "

Victoria de Durango, Dgo. 23 de Septiembre del 2015

M.C. Martha Elia Muñoz Martínez
Directora de la Facultad

DIRECCIÓN

INSTITUTO TECNOLOGICO DE DURANGO
Vo. Bo.
Dr. Nicolás Soto Cruz
Subdirector Académico

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SUBDIRECCION ACADEMICA

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Institutos Tecnológicos

Dirección General de Educación Superior Tecnológica

Instituto Tecnológico Superior de Santiago Papasquiaro

Otorga el presente

Reconocimiento

a la

DRA. NURIA ROCHA GUZMÁN

Por impartir la conferencia magistral FUENTES INNOVADORAS PARA EL DESARROLLO DE BEBIDAS FUNCIONALES impartida en el marco de la 3° FERIA ACADÉMICA DEL INSTITUTO TECNOLÓGICO SUPERIOR DE SANTIAGO PAPASQUIARO.

Santiago Papasquiaro, Durango, a 14 de mayo de 2015.

Ing. Ana Lilia Lomas Aguirre
Directora General

20 Aniversario TEC SANTIAGO

INSTITUTO TECNOLÓGICO de Durango
SUBDIRECCIÓN ACADÉMICA

Dr. Nicolás Soto Cruz
Subdirector Académico

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V°B°

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NOV 2013 - NOV 2016

TECNOLÓGICO NACIONAL DE MÉXICO

EL INSTITUTO TECNOLÓGICO DE TEPIC

OTORGA EL PRESENTE

RECONOCIMIENTO

A

INSTITUTO TECNOLOGICO DE DURANGO
Vo. Bo.
Dr. Nicolás Soto Cruz
Subdirector Academico

DRA. NURIA ROCHA GUZMÁN

Por haber impartido la conferencia:

INSTITUTO TECNOLOGICO de Durango
SUBDIRECCION ACADEMICA

"ALIMENTOS FUNCIONALES: ESTRATEGIAS PARA SU ESTUDIO"

DURANTE LA III JORNADA DE AVANCES EN CIENCIA Y TECNOLOGÍA DE ALIMENTOS DENTRO DE LOS EVENTOS DE LA SEMANA ACADÉMICA DEL POSGRADO EN CIENCIAS EN ALIMENTOS DEL INSTITUTO TECNOLÓGICO DE TEPIC.

REALIZADA EL DÍA 8 DE OCTUBRE DEL 2015

"Sabiduría Tecnológica, Pasión de Nuestro Espíritu"®

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M.C. ALBINO RODRÍGUEZ DÍAZ
DIRECTOR

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6th FOOD Science Biotechnology Safety

CERTIFICATE OF SPEAKER

INSTITUTO TECNOLOGICO DE DURANGO
Vo. Bo.
Ing. Jesús Astorga Perez
Director

It is certified that :

Dra. Nuria Rocha

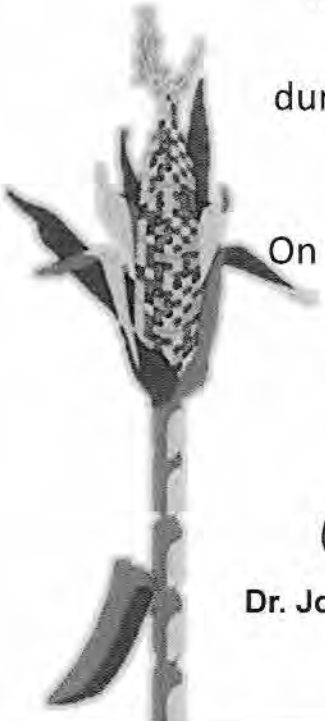
SEP INSTITUTO TECNOLOGICO de Durango
DIRECCIÓN

Gave the presentation entitled:

Innovative Sources for Functional Fermented Beverages

during the 6th Food Science, Biotechnology and Safety Meeting, held in Monterrey, N.L. Mexico, October 8 - 10, 2014

On belhaf of the Asociación Mexicana de Ciencia de los Alimentos, we would like to thank you for your participation.



Dr. José Santos García Alvarado
President of AMECA

Dr. Hugo Sergio García Galindo
President of the Scientific Committee

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