La jara

Un matorral con futuro

Burgos
25 de abril de 2024

Grupo Operativo • ESjara

Unión Europea
Fondo Europeo Agrícola de Desarrollo Rural
Europa invierte en las zonas rurales

GOBIERNO DE ESPAÑA
MINISTERIO DE AGRICULTURA, PESCA Y ALIMENTACIÓN

PNDR
Programa Nacional de Desarrollo Rural 2014-2020

El GO ESjara: Aceite Esencial de jara para el desarrollo de la bioeconomía en el medio rural, busca el desarrollo de la cadena de valor del aprovechamiento de las jaras (Cistus ladanifer y Cistus laurifolius) para la obtención de aceites esenciales valorizando los residuos y subproductos.

Comisión Europea: Área de Agricultura y Desarrollo Rural.

El grupo operativo GO-ESJara ha recibido para su proyecto de innovación una subvención de **599.385,49 €**. El importe del proyecto es financiado al 100% con fondos procedentes del Instrumento de Recuperación Europeo (EU Next Generation), tal como se establece en el Real Decreto 169/2018, de 23 de marzo.

El organismo responsable del contenido es el GO-ESjara.

La Dirección General de Desarrollo Rural, Innovación y Formación Agroalimentaria (DGDRIFA) es la autoridad de gestión encargada de la aplicación de la ayuda del FEADER.

«Fondo Europeo Agrícola de Desarrollo Rural: Europa invierte en las zonas rurales»

SOCIOS

cesefor
CORAZÓN FORESTAL, espíritu investigador

GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA, INNOVACIÓN Y UNIVERSIDADES
Ciemat ceder
centro de desarrollo de energías renovables

agresta

FAFCYLE

BIOLANDES ANDALUCIA

El Jarpil
Productos naturales y ecológicos

ID Forest

Unión Europea
Fondo Europeo Agrícola de Desarrollo Rural
Europa invierte en las zonas rurales

GOBIERNO DE ESPAÑA
MINISTERIO DE AGRICULTURA, PESCA Y ALIMENTACIÓN

PNDR
Programa Nacional de Desarrollo Rural 2014-2020

GRUPO OPERATIVO ESJARA

Grupo Operativo ESjara
Aceite ESencial de jara para el desarrollo de la bioeconomía en el medio rural

ESJARA - ACEITE ESENCIAL DE JARA PARA EL DESARROLLO DE LA BIOECONOMÍA EN EL MEDIO RURAL.

Actuación cofinanciada por la Unión Europea

Unión Europea
Fondo Europeo Agrícola de Desarrollo Rural

Europa invierte en las zonas rurales

INVERSIÓN:

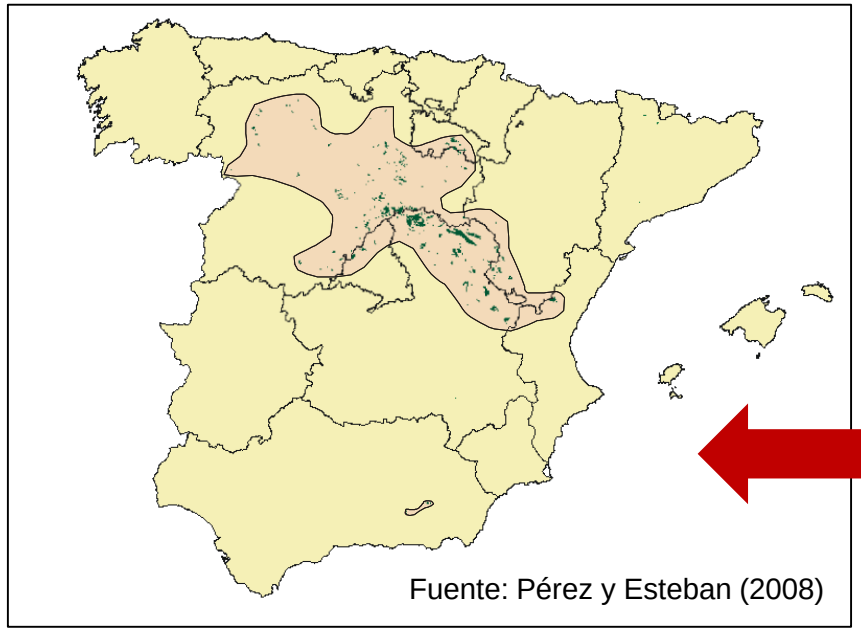
Total	611.486,29 €
Cofinanciación UE	100 %

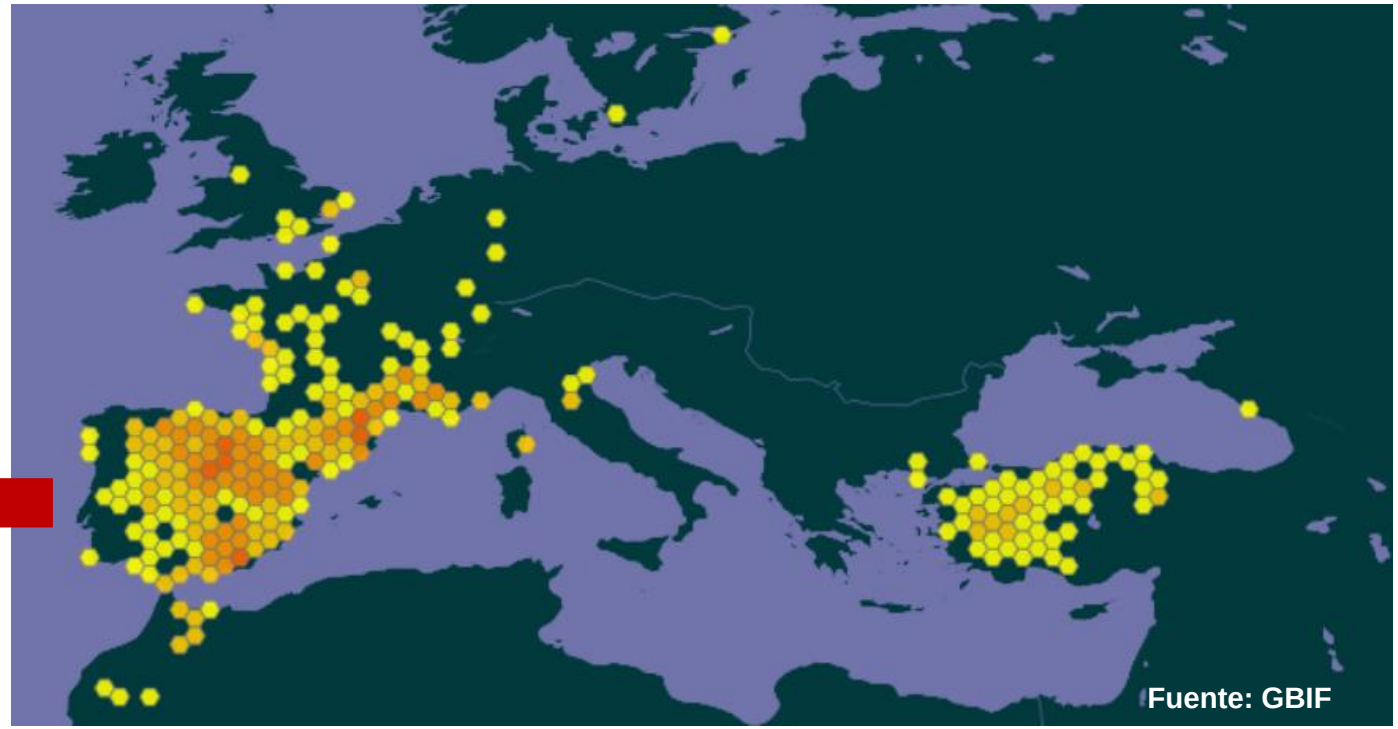
APROVECHAMIENTO DE ESTEPA PARA OBTENCIÓN DE BIOPRODUCTOS

IRENE MEDIAVILLA
irene.mediavilla@ciemat.es

Grupo Operativo • ESjara

ESTEPA: LOCALIZACIÓN





Los estepares de *C. laurifolius* ocupan más de 51.000 ha como especie dominante y alrededor de 680.000 ha como especie secundaria

Grupo Operativo ESjara

ESTEPA: USOS

USOS TRADICIONALES: PLANTA MEDICINAL EN TURQUÍA

- Tratamiento de **hemorroides** (doi: 10.1016/j.jep.2023.117122)
- Tratamiento de **úlceras pépticas** (Yesilada et al., 1997)
- **Analgésico y anti-inflamatorio** (doi: 10.1016/j.jep.2007.04.011)
- **Antioxidante** (doi: 10.1016/j.jics.2022.100569)

Comprobación con estudios científicos sobre extractos alcohólicos

ESTUDIOS CIENTÍFICOS SOBRE OTRAS APLICACIONES DE EXTRACTOS CON RESULTADOS PROMETEDORES

- Efecto **antidiabético** (doi: 10.1016/j.jep.2013.02.016)
- Efecto contra enzimas que influyen en el **Alzheimer** (doi: 10.1016/j.foodchem.2011.09.041)

ESTUDIOS CIENTÍFICOS SOBRE ACEITE ESENCIAL

- Efecto **antiedad sobre la piel** (doi: 10.3390/molecules27072053)

Grupo Operativo ESjara

ESTUDIO SOBRE LA OBTENCIÓN DE ACEITE ESENCIAL DE ESTEPA Y SU BIOACTIVIDAD

EUBCE
31st European Biomass Conference & Exhibition

31st European Biomass Conference and Exhibition, 5-8 June 2023, Bologna, Italy

CISTUS LAURIFOLIUS L. ESSENTIAL OIL, A HIGH ADDED VALUE PRODUCT OBTAINED WHILE REDUCING FOREST FIRES RISK

I. Mediavilla[1], L. Barros[2,3], T.C.S.P. Pires[2,3], R. Corredor[1], L.S. Esteban[1]
[1] CEDER-CIEMAT. Autovía de Navarra A15, salida 56. 42290 Lubia (Soria) SPAIN. Telephone: +34975281013. irene.mediavilla@ciemat.es
[2] Centro de Investigação de Montanha (CIMO), Instituto Politécnico de Bragança. Campus de Santa Apolónia. 5300-253 Bragança. PORTUGAL.
[3] Laboratório Associado para a Sustentabilidade e Tecnologia em Regiões de Montanha (SusTEC), Instituto Politécnico de Bragança, Campus de Santa Apolónia, 5300-253 Bragança, Portugal.

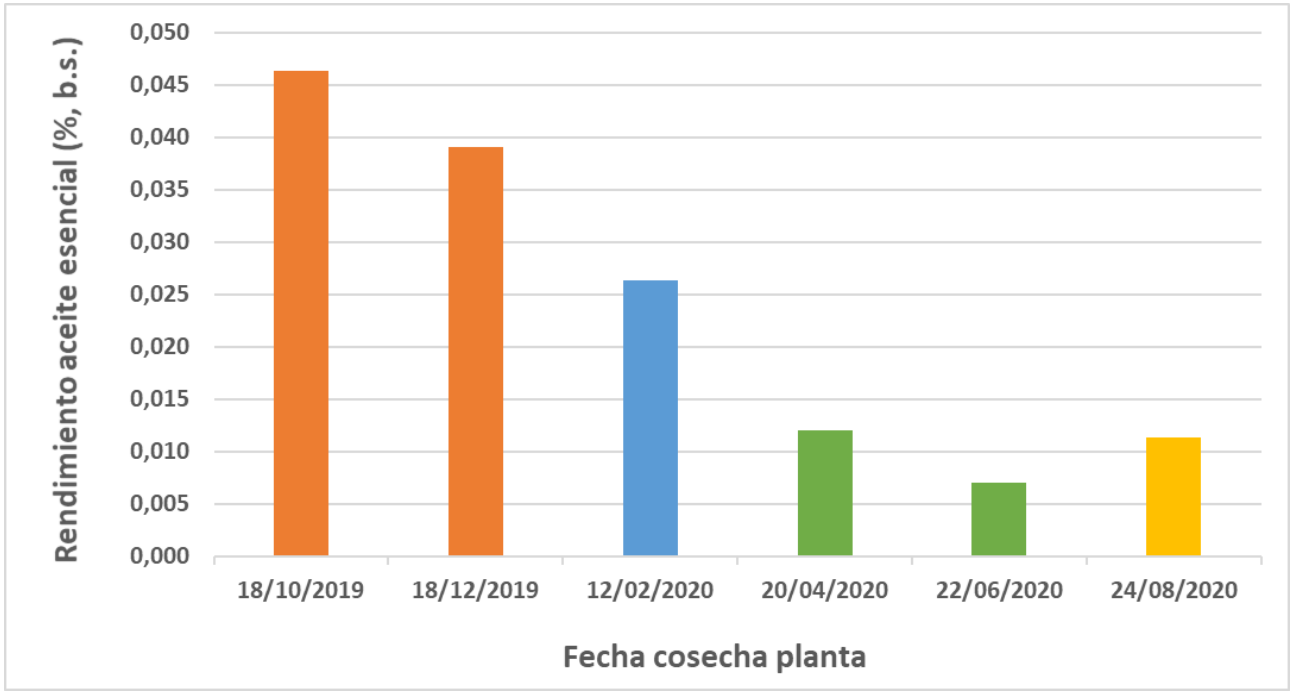
ABSTRACT: *Cistus laurifolius* is a shrub naturally distributed in the Iberian Peninsula, Morocco, Southern France, and Turkey. It is known for its resistance to extreme continental climates and adaptability to poor and dry soils, particularly in burnt areas. Promising results have been obtained concerning its harvesting, conditioning, and combustion, although considering the high costs involved in forest management of shrub lands, the search of high added value products, like essential oils, is a key factor to achieve economic viability. The objective of this work is to study the annual variation of *C. laurifolius* essential oil yield, composition, and antibacterial activity. Samples of *Cistus laurifolius* were collected in central-East Spain each 2 months between October 2019 and August 2020 and were distilled using steam distillation. Low yields of essential oil were obtained, with the highest values in autumn followed by winter. Regarding the composition of the essential oil, it was variable along the year, with higher concentrations of monoterpenes and oxygenated monoterpenes in autumn and winter, and higher concentrations of sesquiterpenes and oxygenated sesquiterpenes in spring and summer. Additionally, the essential oil exhibited bacteriostatic activity against Gram-negative and Gram-positive bacteria, with particular effectiveness against *Staphylococcus aureus*.
Keywords: bacteria, biobased products, forest residues, steam distillation

Grupo Operativo • ESjara

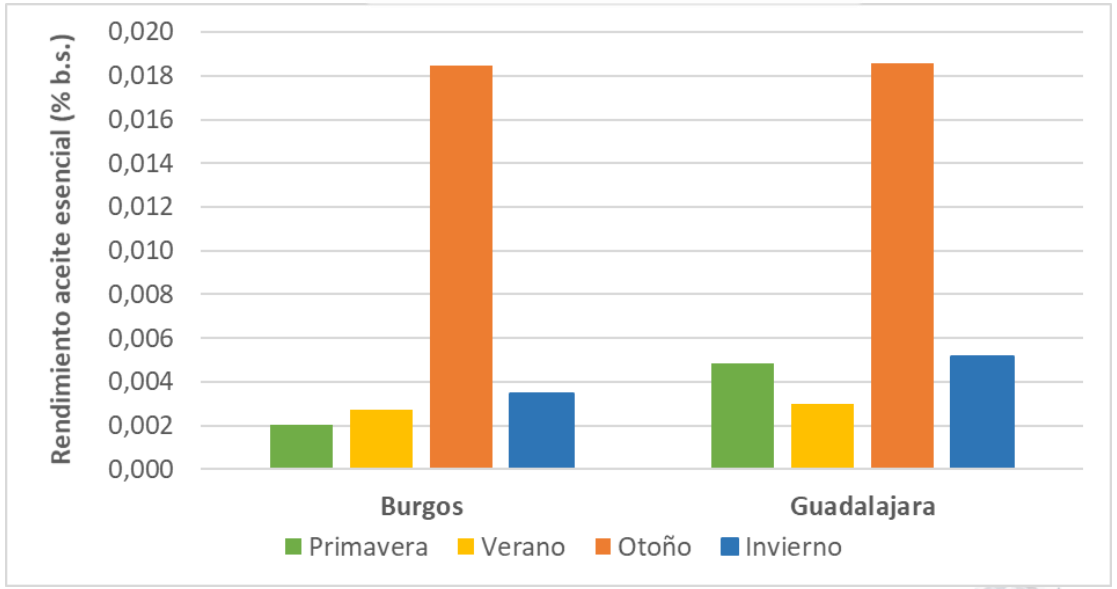
EUBCE
31st European Biomass Conference & Exhibition

ESTUDIO SOBRE LA OBTENCIÓN DE ACEITE ESENCIAL DE ESTEPA Y SU BIOACTIVIDAD

EVOLUCIÓN DEL RENDIMIENTO DE PRODUCCIÓN DE ACEITE A LO LARGO DE UN AÑO



Grupo Operativo ESjara



Grupo Operativo ESjara

EUBCE
31st European Biomass Conference & Exhibition

ESTUDIO SOBRE LA OBTENCIÓN DE ACEITE ESENCIAL DE ESTEPA Y SU BIOACTIVIDAD

ACTIVIDAD ANTIBACTERIANA DE LOS ACEITES ESENCIALES

Table I: Antibacterial activity of *C. laurifolius* essential oil (MIC and MBC values, % (v/v)) (samples of biomass collected from October 2019 to February 2020)

Bacteria	18/10/2019	18/12/2019	12/02/2020
Gram negative			
	MIC / MBC	MIC / MBC	MIC / MBC
Escherichia coli	2.5 / b	2.5 / b	2.5 / b
Pseudomonas aeruginosa	2.5 / b	2.5 / b	2.5 / b
Gram positive			
Propionibacterium acnes	b / b	b / b	b / b
Staphylococcus aureus	0.15 / b	0.3 / b	0.3 / b

b: No inhibition was visually observed for the maximum tested concentration (2.5%) Positive controls: **Streptomycin** (*Escherichia coli* (0,01mg/mL); *Pseudomonas aeruginosa* (0.06mg/mL); *Staphylococcus aureus* (0.007mg/mL)) **Vancomycin** (*Propionibacterium acnes* (0.07 mg/mL)).

Table II: Antibacterial activity of *C. laurifolius* essential oil (MIC and MBC values, % (v/v)) (samples of biomass collected from April 2020 to August 2020)

Bacteria	20/04/2020	22/06/2020	24/08/2020
Gram negative			
	MIC / MBC	MIC / MBC	MIC / MBC
Escherichia coli	2.5 / b	2.5 / b	1.25 / b
Pseudomonas aeruginosa	2.5 / b	1.25 / b	1.25 / b
Gram positive			
Propionibacterium acnes	1.25 / b	1.25 / b	1.25 / b
Staphylococcus aureus	0.3 / b	0.15 / b	0.07 / b

b: No inhibition was visually observed for the maximum tested concentration (2.5%) Positive controls: **Streptomycin** (*Escherichia coli* (0,01mg/mL); *Pseudomonas aeruginosa* (0.06mg/mL); *Staphylococcus aureus* (0.007mg/mL)) **Vancomycin** (*Propionibacterium acnes* (0.07 mg/mL)).

Se encontró mayor actividad antibacteriana frente a las bacterias testadas (*E. coli, P. aeruginosa, P. acnes, S. aureus*) en los meses de **verano**, pudiendo destacarse la actividad contra la ***S. aureus***

Grupo Operativo • ESjara

ANÁLISIS DE LA ESTEPA COMO BIOCOMBUSTIBLE

Energy 204 (2020) 117928

Contents lists available at ScienceDirect

Energy

journal homepage: www.elsevier.com/locate/energy

Effect of mechanical harvesting on the chemical composition and combustion behaviour of shrub biomass

Irene Mediavilla *, Miguel J. Fernández , Ruth Barro , Elena Borjabad , Raquel Bados , Luis S. Esteban

CEDER-CIEMAT, Autovía de Navarra A-15, salida 56, 42290, Lubia, Soria, Spain

ARTICLE INFO

Article history:
Received 5 August 2019
Received in revised form
12 May 2020
Accepted 19 May 2020
Available online 25 May 2020

Keywords:
Broom
Combustion behaviour
Gorse
Harvesting
Rockrose
Shrub

ABSTRACT

Shrub lands are an important source of genetic resources and raw materials for a bioeconomy-based future. The main objective of this study is to determine the effect of mechanical harvesting on the chemical composition and the combustion quality properties of typical shrub formations in the Mediterranean area, whose prevailing species are broom, rockrose and gorse.

Above ground, shrub biomass was collected manually and mechanically and its main properties and chemical composition were compared. Its combustion behaviour was predicted by using fuel indices related to emissions, deposit build-up and ash melting. The predictions were evaluated after performing combustion tests with mechanically harvested shrub pellets.

The chemical composition and combustion behaviour of the biomass differed greatly depending on the prevailing species. Mechanised harvesting can cause the ash content and the levels of several elements, particularly Si, to increase through the inclusion of soil particles, which influence combustion behaviour. The Si/(Ca+Mg) index appears to be a good indicator to predict the slagging tendency of these fuels. However, the K+Na+Zn+Pb index could not accurately predict aerosol emissions and ash deposition. The information provided by this index should be complemented by using the Si/K index, which considers the influence of Si on alkali retention.

biology

MDPI

Article

The Influence of the Long-Term Outdoor Storage of Rockrose (*Cistus laurifolius* L.) Shrub Biomass on Biofuel's Quality, Pre-Treatment and Combustion Processes

Raquel Bados [1,*], Irene Mediavilla [1], Eduardo Tolosana [2], Elena Borjabad [1], Raquel Ramos [1], Miguel José Fernández [1], Paloma Pérez [1] and Luis Saúl Esteban [1]

[1] CEDER-CIEMAT, Centro de Desarrollo de Energías Renovables—Centro de Investigaciones Energéticas Medioambientales y Tecnológicas, Autovía A-15, Salida 56, 42290 Lubia, Spain; irene.mediavilla@ciemat.es (I.M.); elena.borjabad@ciemat.es (E.B.); raquel.ramos@ciemat.es (R.R.); miguel.fernandez@ciemat.es (M.J.F.); paloma.perez@ciemat.es (P.P.); luis.esteban@ciemat.es (L.S.E.)

[2] Departamento de Ingeniería y Gestión Forestal y Ambiental, E.T.S.I. Montes, Forestal y del Medio Natural, Universidad Politécnica De Madrid, C/José Antonio Novais 10, Campus Ciudad Universitaria, 28040 Madrid, Spain; eduardo.tolosana@upm.es

* Correspondence: raquel.bados@ciemat.es; Tel.: +34-975-281-013

Simple Summary: Rockrose (*Cistus laurifolius* L.) is a pyrophyte species with allelopathic effects that colonizes acid forest soils in the Mediterranean basin. Its continuous spread contributes to increasing wildfire risk, even more so in the current context of forecasts of increasingly intense and prolonged heat waves and droughts. Its mechanized collection and transformation into biofuels contributes to climate change mitigation, the economic development of rural areas and wildfire risk reduction. Biomass storage is an essential requirement in the supply chain of bio-refineries and biomass plants. This research aims to evaluate the influence of long-term outdoor storage (1 year) of baled rockrose shrub biomass on the quality of biofuels (30 mm milled material and pellets), on pre-treatment processes and on combustion emissions in an industrial boiler. After storage, no significant differences were observed in the biomass pre-treatment processes or in the emissions in an industrial combustion boiler. Biomass weight loss was 12% after storage. Some quality biofuels parameters improved, with the reduction in ash content being the most prominent aspect, which allowed 30 mm of milled material to be classified as I1, according to ISO 17225-9:2022, and rockrose pellets as class I3 for industrial use, according to the ISO 17225-2-2021 standard.

check for updates

Citation: Bados, R.; Mediavilla, I.; Tolosana, E.; Borjabad, E.; Ramos, R.; Fernández, M.J.; Pérez, P.; Esteban, L.S. The Influence of the Long-Term Outdoor Storage of Rockrose (*Cistus*

Grupo Operativo • ESjara

ANÁLISIS DE LA ESTEPA COMO BIOCOMBUSTIBLE

Table 3
Composition of the biomass collected manually from shrub lands characterised by different prevailing species.

Area		Las Navas del M.	Garray	As Pontes de G. R.
Main shrub		Broom	Rockrose	Gorse
Property	Unit	Average (n = 30)	Average (n = 30)	Average (n = 30)
Moisture	wt.%, w.b.	37.2b	32.2a	47.2c
Ash	wt%, d.b.	1.4a	2.6b	1.5a
HHV	MJ/kg, d.b.	20.73c	19.90a	20.12b
LHV	MJ/kg, d.b.	19.36c	18.58a	18.78b
C	wt.%, d.b.	50.6b	49.4a	50.4b
H	wt.%, d.b.	6.3c	6.0a	6.2b
N	wt.%, d.b.	1.1c	0.47a	0.85b
S	wt.%, d.b.	0.06b	0.04a	0.06b
Cl	wt.%, d.b.	0.05b	0.02a	0.07c
Al	wt.%, d.b.	0.020a	0.035a	0.020a
Ca	wt.%, d.b.	0.17a	0.76b	0.15a
Fe	wt.%, d.b.	0.012a	0.046a	0.016a
K	wt.%, d.b.	0.31c	0.21a	0.27b
Mg	wt.%, d.b.	0.067a	0.068a	0.068a
Na	wt.%, d.b.	0.0046a	0.0048a	0.074b
P	wt.%, d.b.	0.047ab	0.039a	0.052b
Si	wt.%, d.b.	0.23b	0.21ab	0.16a
Ti	wt.%, d.b.	0.0011a	0.0014a	0.0014a

n: number of samples; wt.%: weight %; w.b.: wet basis; d.b.: dry basis; HHV: high heating value; LHV: low heating value.

Table 4
Trace elements of the biomass collected manually from shrub lands characterised by different prevailing species.

Area		Las Navas del M.		Garray		As Pontes de G. R.	
Main shrub		Broom		Rockrose		Gorse	
Element	Unit	Aver. (n = 30)	Max.	Aver. (n = 30)	Max.	Aver. (n = 30)	Max.
As	mg/kg, d.b.	<0.10 (83%)	0.14	<0.10 (97%)	0.11	<0.10 (87%)	0.26
Cd	mg/kg, d.b.	<0.10 (83%)	0.20	0.37	1.1	<0.10 (47%)	0.88
Cr	mg/kg, d.b.	<1.0 (100%)	<1.0	<1.0 (100%)	<1.0	<1.0 (80%)	3.2
Cu	mg/kg, d.b.	3.3	7.1	2.7	4.0	8.1	145
Hg	mg/kg, d.b.	0.007	0.011	0.007	0.013	0.005	0.030
Ni	mg/kg, d.b.	<1.0 (90%)	2.4	2.0	3.8	2.1	4.1
Pb	mg/kg, d.b.	<1.0 (97%)	1.8	<1.0 (50%)	4.0	<1.0 (93%)	4.2
Zn	mg/kg, d.b.	19	35	23	42	14	41

n: number of samples; Aver.: average; Max.: maximum; d.b.: dry basis.

Table 5
Composition of the shrub pellets produced from biomass collected by mechanical means.

Parameter	Unit	Broom	Rockrose	Gorse	Pine
Moisture	wt.%, w.b.	9.6	7.2	10.8	6.3
Ash	wt%, d.b.	1.4	4.2	3.8	0.5
HHV	MJ/kg, d.b.	20.27	19.94	19.90	20.39
LHV	MJ/kg, d.b.	18.90	18.68	18.57	19.07
C	wt.%, d.b.	50.3	50.2	50.0	51.4
H	wt.%, d.b.	6.3	5.8	6.1	6.1
N	wt.%, d.b.	0.88	0.40	0.97	<0.05
S	wt.%, d.b.	0.04	0.04	0.08	0.02
Cl	wt.%, d.b.	0.03	0.03	0.07	0.01
Al	wt.%, d.b.	0.036	0.063	0.22	0.007
Ca	wt.%, d.b.	0.15	0.67	0.35	0.11
Fe	wt.%, d.b.	0.020	0.046	0.14	0.0070
K	wt.%, d.b.	0.21	0.24	0.30	0.043
Mg	wt.%, d.b.	0.060	0.067	0.10	0.018
Na	wt.%, d.b.	0.011	0.0067	0.095	0.0024
P	wt.%, d.b.	0.046	0.050	0.061	0.0055
Si	wt.%, d.b.	0.15	0.67	0.72	0.033
Ti	wt.%, d.b.	0.0021	0.0059	0.0095	0.00039

wt.%: weight %; w.b.: wet basis; d.b.: dry basis; HHV: high heating value; LHV: low heating value.

Grupo Operativo • ESjara

ANÁLISIS DE LA ESTEPA COMO BIOCOMBUSTIBLE

PARÁMETRO	ESTEPA	REFERENCIA ISO 17225-9:2022 (mat. triturado uso industrial)			
		I1	I2	I3	I4
Ceniza (%, b.s.)	2,6	≤3,0	≤5,0	≤6,0	≤7,0
N (%, b.s.)	0,47	≤0,5	≤1,0	≤1,0	≤1,5
S (%, b.s.)	0,04	≤0,05	≤0,1	≤0,1	≤0,1
Cl (%, b.s.)	0,02	≤0,05	≤0,05	≤0,1	≤0,1
As (mg/kg, b.s.)	<0,10	≤1,0	≤1,0	≤4,0	≤4,0
Cd (mg/kg, b.s.)	0,37	≤2,0	≤2,0	≤2,0	≤2,0
Cr (mg/kg, b.s.)	<1,0	≤20	≤20	≤20	≤30
Cu (mg/kg, b.s.)	2,7	≤30	≤30	≤30	≤50
Pb (mg/kg, b.s.)	<1,0	≤10	≤20	≤20	≤30
Hg (mg/kg, b.s.)	0,007	≤0,1	≤0,1	≤0,1	≤0,1
Ni (mg/kg, b.s.)	2,0	≤10	≤10	≤10	≤10
Zn (mg/kg, b.s.)	23	≤100	≤100	≤100	≤100

GRACIAS POR SU ATENCIÓN

Irene Mediavilla
irene.mediavilla@ciemat.es

Grupo Operativo ESjara
Aceite ESencial de jara para el desarrollo de la bioeconomía en el medio rural

Unión Europea
Fondo Europeo Agrícola de Desarrollo Rural
Europa invierte en las zonas rurales

GOBIERNO DE ESPAÑA
MINISTERIO DE AGRICULTURA, PESCA Y ALIMENTACIÓN

PNDR
Programa Nacional de Desarrollo Rural 2014-2020

El GO ESjara: Aceite Esencial de jara para el desarrollo de la bioeconomía en el medio rural, busca el desarrollo de la cadena de valor del aprovechamiento de las jaras (Cistus ladanifer y Cistus laurifolius) para la obtención de aceites esenciales valorizando los residuos y subproductos.

Comisión Europea: Área de Agricultura y Desarrollo Rural.

El grupo operativo GO-ESJara ha recibido para su proyecto de innovación una subvención de 599.385,49 €. El importe del proyecto es financiado al 100% con fondos procedentes del Instrumento de Recuperación Europeo (EU Next Generation), tal como se establece en el Real Decreto 169/2018, de 23 de marzo.

El organismo responsable del contenido es el GO-ESjara.

La Dirección General de Desarrollo Rural, Innovación y Formación Agroalimentaria (DGDRIFA) es la autoridad de gestión encargada de la aplicación de la ayuda del FEADER.

«Fondo Europeo Agrícola de Desarrollo Rural: Europa invierte en las zonas rurales»

SOCIOS

cesefor CORAZÓN FORESTAL, espíritu investigador

GOBIERNO DE ESPAÑA MINISTERIO DE CIENCIA E INNOVACIÓN

Ciemat ceder

agresta

FAFCYLE

BIOLANDES ANDALUCIA

El Jarpil

ROOTECO AGRICULTURE REVOLUCIONA TUS CULTIVOS