CAMELINA (Camelina sativa) - AN ATTRACTIVE NEW OIL CROP FOR EUROPE AND CANADA

AAIC 2016 ASSOCIATION FOR THE ADVANCEMENT OF INDUSTRIAL CROPS

INTERNATIONAL CONFERENCE

"INDUSTRIAL CROPS: PROMOTING SUSTAINABILITY"

24-28 September, 2016

Rochester, NY

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Conference Program

Sunday, September 25

7:30 AM-6:30 PM	Niagara Falls Tour –both US and Canadian sides (Passport required)	Meet outside hotel
6:30- 7:30 PM	Registration Desk Open	Foyer-Riverview Lounge
6:30-7:30 PM	Poster Set up	Anthony (A)
6:30-7:30 PM	AAIC Board of Directors Meeting	Boardroom
7:30-9:00 PM	Welcome reception	Riverview Ballroom-Lounge

Monday, September 26

Plenary Session

Moderator: Marisol Berti

Room: C&D

8:00-10:00 AM	Registration Desk Open and Poster set up	
8:00 AM	Welcome and introduction	
8:15 AM	Keynote speaker- Jack Grushcow, Linnaeus Plant Sciences Inc., Canada	Camelina advances in breeding and market opportunities
9:00 AM	Edward Fletcher, Herbal Ingenuity	Sustainable production of herbal medicines
9:45 AM	Coffee Break	Room: Anthony (A)
10:15 AM	Charles Mullen, Sustainable Biofuels and Coproducts Eastern Regional Research Center, ARS, USDA	Guayule Pyrolisis biorefining
11:00 AM	Bus departs to Casa Larga vineyard	
11:30 AM	Vineyard tour and wine tasting- lunch	Lunch

3:00-5:00 PM	Visit to Worm Power Farm, Avon, NY	
6:00 PM	Dinner on your own	
6:30-8:30 PM	CGC meeting- David Dierig	Boardroom

Tuesday, September 27

TECHNICAL SESSIONS
Concurrent sessions

1. Oilseeds Division
Moderator: Liv Severino, EMBRAPA Algodao, Brazil
Room: C

8:00 AM	**Keynote speaker Alexandre N. Cardoso**, B.G. Laviola, Gilmar S. Santos, S.P. Favaro, M.T. Souza, L.S. Severino, Luiz C. Veras[2], Humberto U. de Souza, M.F. Braga, R Ciannella[5]	Macaw palm - a potential biomass for oil production in Brazil
8:30 AM	Elodie Gazave, E.E. Tassone, D.C. Ilut, M. Wingerson, E. Datema, H. M. A. Witsenboer, J. B. Davis, D. Grant, J.M. Dyer, M.A. Jenks, J. Brown, and M.A. Gore	Population genomic analysis reveals differential evolutionary histories and patterns of diversity across subgenomes and subpopulations of *Brassica napus* L.
8:50 AM	Federica Zanetti, C. Eynck, M. Christou, M. Krzyżaniak, M. Stolarski, D. Righini, E. Alexopoulou, E.N. Van Loo, D. Puttick, J. Tworkowski, and A. Monti	Camelina [*Camelina sativa* (L.) Crantz.]- an attractive new oil crop for Europe and Canada
9:10 AM	Marisol T. Berti, B.L. Johnson, D. Samarappuli, and R. Gesch	Integrating winter camelina [*Camelina sativa* (L.) Crantz.] into corn and soybean cropping systems
9:30 AM	Efthymia Alexopoulou	A comparison between a number of new released castor (*Ricinus communis* L.) hybrids and two native castor varieties in Greece

9:50 AM	Federica Zanetti, C. Chieco, E. Alexopoulou, A. Vecchi, and A. Monti	Bringing back castor (*Ricinus communis* L.) to Europe: a promising multipurpose crop
10:10 AM	Liv S. Severino, D.L. Auld, L.S. Vale, L.F. Marques, and O.J. Gaona-Cordoba	Castor (*Ricinus communis* L.) plants establish interplant hierarchy according to the planting density
10:30 AM	Coffee Break – Room: Anthony (A)	
11:30 AM	**Oilseeds Division meeting**	
12:00	Lunch	Room: Douglass (B)

Concurrent Session

2. Fibers and Cellulosics

Moderator: Dilpreet Bajwa, North Dakota State University

Room: D

8:00 AM	**Keynote speaker : Anil N. Netravali** Dept. of Fiber Science &Apparel design, Cornell University	Cellulose Fiber Reinforced 'Green' Composites
8:40 AM	Panjak Pandey, S.G. Bajwa, and D.S. Bajwa	Effect of UV weathering on DDGS fiber filled thermoplastic composite
9:00 AM	Cindy S. Barrera, and K. Cornish	Statistical modelling of natural rubber composites properties based on filler's characteristics
9:20 AM	D.S. Bajwa, Greg A. Holt, S.G. Bajwa, S.E. Duke, and G. McIntyre	Enhancement of termite resistance in mycelium reinforced biofiber-composites
9:40 AM	Dilpreet S. Bajwa, and E.D. Sitz	Processing and manufacture of soybean and wheat straw medium density fiberboard utilizing epoxidized sucrose soyate resin
10:00 AM	Efthymia Alexopoulou, and Tang Shouwei	The importance of bast fiber crops as feedstock for biobased products and bioenergy
10:20 AM	Coffee break	Room: Anthony

10:50 AM	Burton L. Johnson, B.K. Hanson, J. Kostuik, M.T. Berti, and P.J. Petersen	Industrial hemp (*Cannabis sativa* L.) Stand establishment and yield in North Dakota
11:10 AM	**Fiber and Cellulosics Division Meeting**	
12:00	Lunch	Douglass

Concurrent Session

3. General Crops Division
Moderator: Efthymia Alexopoulou, CRES, Greece
Room: C

1:30 PM	**Keynote speaker: Ana Luisa Fernando**	Production of industrial crops in marginal soils – Is it a sustainable option?
2:10 PM	Efthymia Alexopoulou	Switchgrass (*Panicum virgatum* L.): An ideal perennial crop for marginal lands
2:30 PM	Nicola Di Virgilio, Osvaldo Facini, Federica Rossi, and Andrea Monti	Ecosystem gas exchange of switchgrass (*Panicum virgatum* L.) in the Mediterranean area
2:50	Ana Luisa Fernando	Is it sustainable to produce *Miscanthus x giganteus* Greef et Deu in sewage sludge contaminated soils?
3:10	Coffee Break	Room: Anthony
3:30	Valerie H. Teetor, C. Schmalzel, and D.T. Ray	Planting sweet sorghum (*Sorghum bicolor* [L.] Moench) in clumps reduces lodging but not yields
3:50	Alan G. Taylor, W. Huang, M. Amirkhani, H.S. Mayton, and D. Wang	Seed technology of eastern gamagrass [*Tripsacum dactyloides*] to enhance germination and seedling survival and break dormancy
4:10 PM	**General Crops and Products Division Meeting**	
5:00-6:30	**Poster session (All divisions)- Room: Anthony**	

Concurrent session
4. Natural Rubber and Resins
Moderator: Katrina Cornish
Room: D

1:30 PM	***Keynote speaker: Howard Colvin***	Securing the future of natural rubber – an American tire and bioenergy platform from guayule (*Parthenium argentatum* Gray)
2:10 PM	M. Dorget, A. Amor, Serge Palu, and D. Pioch	European guayule (*Parthenium argentatum* Gray) market
2: 30 PM	A. Amor, C. Sanier, J.-L. Verdeil, M. Lartaud, T. Punvichai, E. Tardan, Serge Palu, and D. Pioch	Biomass imaging as a tool for addressing the challenge of multiple-product guayule (*Parthenium argentatum* Gray) biorefinery
2:50 PM	L. Brancheriau, Serge Palu, D. Pioch, N.Boutahar, E. Tardan, P. Sartre, J.M. Ebel, and E. Becourt	NIRS measurement at field level to measure rubber and resin content of guayule (*Parthenium argentatum* Gray) plants
3:10 PM	Douglas J. Hunsaker, and D.M. Elshikha	Guayule (*Parthenium argentatum* Gray) rubber production in the US desert with surface and subsurface drip irrigation and five water levels
3:30 PM	Daniel C. Ilut, P.L. Sanchez, J.M. Dyer, M.A. Jenks, and M.A. Gore	Applications of modern genomics for domestic natural rubber development: taking stock of guayule (*Parthenium argentatum* Gray) germplasm
3:50 PM	Lauren D. Johnson and M. Fraley	Panaridus update on guayule (*Parthenium argentatum* Gray) plant breeding and direct seeding
4:10 PM	Hussein Abdel-Haleem	Phenotypic characterization of guayule (*Parthenium argentatum* Gray) USDA collection under field conditions
4:30 PM	A. Pantel, S. Park, V.M.V. Cruz, D.T. Ray, W.S. Niaura, and David A. Dierig	Rate of apomixis in USDA germplasm for guayule (*Parthenium argentatum* Gray) breeding
5:00-6:00	**Poster session (All divisions) Room-Anthony**	
	Dinner on your own	

Wednesday 28 September

TECHNICAL SESSIONS

Concurrent Sessions

5. Natural Rubber and Resins
Moderator: Katrina Cornish
Room: D

8:00 AM	Colleen McMahan, U. Hathwaik, and D. Lhamo	Role of proteins and amino acids in natural rubber: guayule (*Parthenium argentatum* Gray) rubber addition studies
8:20 AM	Varun Venoor, K. Cornish, K. Koelling, and Y. Vodovotz	Bio-based composites for food packaging
8:40 AM	B.A. King, L.D. Johnson, and M. Fraley	Genetic and environmental effects on quality of guayule (*Parthenium argentatum* Gray) natural rubber
8:50 AM	***Keynote: Katrina Cornish,*** S. McNulty, N. Amstutz, and G. Bates	Progress in improving rubber yield of *Taraxacum kok-sagyz*
9:30 AM	B. Iaffaldano, Yingxiao Zhang, and K. Cornish	CRISPR/CAS9 genome editing of rubber producing dandelion *Taraxacum kok-saghyz* using agrobacterium rhizogenes without selection
9:50 AM	Muhammad Akbar Abdul Ghaffar	Increasing rubber production by post- harvest ethephon application in *Taraxacum kok-saghyz* roots
10:10 AM	Coffee break	Room: Anthony
10:30 AM	Zinan (Lily) Luo, B. Iaffaldano, X. Zhuang, M. Ma, and K. Cornish	Transcriptome analysis of *Taraxacum kok-saghyz* using RNA-seq and identification of candidate genes related to the rubber biosynthesis pathway
10:50 AM	Ming Ma, S.K. McNulty, S.E. Kopicky, Z. Luo, and K. Cornish	Quantification of natural rubber in *Taraxacum kok-saghyz* by near infrared reflectance spectroscopy

11:10 AM	Richard J. Roseberg, T.B. Silberstein, K. Cornish, S. McNulty, and N. Amstutz	Agronomic management of rubber dandelion (*Taraxacum kok-saghyz* Rodin) for root biomass and natural rubber production in Oregon
11:30 AM	David A. Ramirez-Cadavid, F. Michel Jr., and K. Cornish	*Taraxacum kok-saghyz*: an alternative source of natural rubber and other valuable bioproducts
12:00 PM	Lunch-Business Meeting	Douglass (B)
1:30 PM	**Rubber and Resins Division Meeting**	
2:00 – 3:30 PM	**Poster session and coffee (all divisions)**	

Concurrent session

6. Medicinal and Nutraceutical Plants Division
Moderator: H.Rodolfo Juliani
Room: C

8:00 AM	**Keynote speaker, Lyle E. Cracker**	Trends in research and development of the new marijuana (*Cannabis* sp.)
9:00 AM	Susana Fischer, R. Wilckens, F. Graff, L. Bustamante, J. Jara, W. Valdivia, and M. Aranda	Characterization of proteins in quinoa (*Chenopodium quinoa* Willd.) seeds from plants submitted to water stress
9:20 AM	H.Rodolfo Juliani	Headspace gas chromatography for the determination of volatile components in essential oil research
9:40 AM	Diana Jasso de Rodríguez, D.A. Carrillo-Lomelí, M.E. Rocha-Guzmán, M.R. Moreno Jiménez, R. Rodríguez-García, and J.A. Villarreal Quintanilla	Antioxidant, anti-inflammatory and apoptotic activities of two extracts of *Flourensia microphylla* in HT-29 cells in vitro
10:00 AM	Coffee Break	
10:20 AM	Diana Jasso de Rodríguez, L.C. García-Hernández, N.E. Rocha- Guzmán, M.R. Moreno-Jiménez, R. Rodríguez-García, M.L.V.	Hypoglycemic and anti-inflammatory activities of the corm extract of *Psacalium paucicapitatum*

	Díaz-Jiménez, A. Sáenz-Galindo, J.A. Villarreal-Quintanilla, and F.M. Peña-Ramos	
10:40 AM	Ramnarain Ramakrishna, D. Sarkar, and K. Shetty	Evaluation of phenolic linked anti-hyperglycemic potential of barley (*Hordeum vulgare* L.) cultivars targeting for the management of early stages Type 2 diabetes using in vitro models
11:00 AM	**Medicinal and Nutraceuticals plants Division meeting**	
12:00 PM	**Lunch-Business meeting**	Douglass
2:00 – 3:30 PM	**Poster session (all divisions)**	

Awards Banquet

6:30	Cash bar Riverview Lounge
7:00-9:00 PM	AAIC Awards Banquet-Riverview Ballroom and Lounge

Posters Presentations

Room: Anthony (A)

Fiber and Cellulosics		
1	Efthymia Alexopoulou, T. Shouwei, and Y. Papatheohari	Screening field trials for several kenaf (*Hibiscus cannabinus* L.) varieties in terms on growth and yields in Greece.
2	Defang Li	Comparison of the nutritive value of seven kenaf (*Hibiscus cannabinus* L.) varieties harvested depending on stubble height
3	Huang Siqi	Physiological response in the roots of kenaf (*Hibiscus cannabinus* L.) seedings under cadmium stress
General Crops		
4	Efthymia Alexopoulou	Comparative studies among several fiber and sweet sorghum [*Sorghum bicolor* (L.) Moench] varieties in Greece
5	E.G. Papazoglou, and Ana Luisa Fernando	Sugarbeet (*Beta vulgaris* L.) Cultivation in contaminated land for bioethanol production: a promising perspective
6	Ana Luisa Fernando, M.P. Duarte, M.D. Curt	Delaying sorghum (*Sorghum bicolor* (L.) Moench) harvest dates in the Iberian peninsula – balancing yields and effects on soil quality
7	M. Christou, and Efthymia Alexopoulou	Long term studies on giant reed (*Arundo donax* L.) in a marginal land in central Greece
Medicinal and Nutraceutical		
8	Ashish Christopher, J. Orwat, D. Sarkar, M. McFarland, and K. Shetty	Stress-induced enhancement of phenolic antioxidants in grapes (*Vitis vinifera* L.), targetting bioactive compounds for the management of early stages Type 2 diabetes
9	V. Gomes Lauriano de Souza, and Ana Luisa Fernando	Bioactivity and physical properties of chitosan films incorporated with different natural antioxidants
10	J. Bradley Morris	Production comparisons of Chinese water chestnut [*Eleocharis dulcis* (Burm. F.) Trin. Ex Hensch]

		functional corms grown in hydroponics versus flooded sand
11	Diana Jasso de Rodríguez, N.A. Gaytán-Sánchez, R. Rodríguez-García, F.D. Hernández-Castillo, M.L.V. Díaz-Jiménez, S. González-Morales, A. Sáenz-Galindo, J.A. Villarreal-Quintanilla, and F.M. Peña-Ramos	Antifungal activity of extracts of *Juglans mollis*, *Juglans microcarpa* and *Carya ovata*, against *Fusarium oxysporum* and *Alternaria alternata* in vitro
12	Rosemarie Wilckens, S. Fischer, and Ismael Obal.	Synthesis of antioxidants in sprouts of quinoa (*Chenopodium quinoa* Willd.) in response to abiotic stress
13	R. Rodríguez-García, A. Reyes-Sebastián, Jose Ángel Villarreal-Quintanilla, D. J. de Rodríguez, M.L.V. Díaz-Jiménez, H. Ramírez-Rodríguez, N.A. Ruiz-Torres and F. M. Peña-Ramos	Effect of plant extracts semi-desert in the induction of germination and seedling growth of melon
14	M.L. Flores-López, J.M. Vieira, M.A. Cerqueira, C. Rocha, Diana Jasso de Rodríguez, and A.A. Vicente	Effect of aloe vera (*Aloe barbadensis* Miller) nano-laminate coating on the shelf life parameters of tomato fruits (*Lycopersicum esculentum* Mill.)
15	H. Rodolfo Juliani, A.R. Koroch, and J.E. Simon	Essential oils of basil (*Ocimum* sp) and their associated antioxidant and antimicrobial activity
16	Diana Jasso de Rodríguez, E. de J. Salas-Méndez, R. Rodríguez-García, F.D. Hernández-Castillo, M.L.V. Díaz-Jiménez, A. Sáenz-Galindo, S. González-Morales, J.A. Villarreal-Quintanilla, and F.M. Peña-Ramos	In vitro antifungal activity of extracts of ethanol and water of leaves and stems of *Flourensia* spp. against fungi postharvest
Rubber and Resins		
17	Muhammad Akbar Abdul Ghaffar, T. Meulia, and K. Cornish	Histological study of laticifer and rubber particle ontogeny in *Taraxacum kok-saghyz* roots
18	Cécile Bessou, D. Snoeck, T. Chapuset, F. Jäger, S. Mok, I. Lewandowski, D. Pioch, S. Palu, and Y. Biard	Life cycle assessment of guayule (*Parthenium argentatum* Gray) natural rubber production in Europe
19	Thierry Chapuset, V. Anleu, D. Snoeck, and C. Nájera	Improving rubber productivity by reducing tapping frequencies in Guatemala
20	Yingxiao Zhang, B. Iaffaldano, X. Zhuang, J. Cardina, and K. Cornish	Chloroplast genome resources and molecular markers differentiate rubber dandelion *Taraxacum kok-saghyz* from weedy relatives

21	Zinan (Lily) Luo, and K. Cornish	Induction and identification of tetraploids in *Taraxacum kok-saghyz*
22		
Oilseeds		
23	Reza Keshavarz Afshar, and C. Chen	Yield and yield components of winter camelina (*Camelina sativa* L. Crantz) in response to seeding date and rate
24	Roque L. Evangelista, T.A. Isbell, R.W. Gesch, and S.C. Cermak	Processing of brassica seeds for feedstock in biofuels production
25	M. Christou, Efthymia Alexopoulou, M. Stolarski, M. Krzyżaniak, and J. Hinge	New oil crops for bioenergy and biorefinery in Europe
26	K. Pacella, Ana Luisa Fernando, F. Zanetti, and A. Monti	Growth and yield of oil crops irrigated with wastewaters – the effect of ammonium ion and nitrates
27	C.S. Nascimento, G. Molina Regalado de Oliveira, T. Rodrigues Baran, and Winthrop B. Phippen	Evaluation of the germination rate of pennycress (*Thlaspi arvense* L.) in different conditions of storage and temperature
28	E. Koukouna, E.G. Papazoglou, R.A. Babahmad, A. Ouhammou, A. Outzourhit, and Efi Alexopoulou	Life cycle assessment of biodiesel production from (*Jatropha curcas* L.)

ABSTRACTS

OILSEEDS DIVISION

ORAL PRESENTATIONS

CHAIR

LIV SEVERINO, EMBRAPA ALGODAO, BRAZIL

CAMELINA (*Camelina sativa*) -AN ATTRACTIVE NEW OIL CROP FOR EUROPE AND CANADA

Federica. Zanetti[1], C. Eynck[2], M. Christou[3], M. Krzyżaniak[4], M. Stolarski[4], D. Righini[1], E. Alexopoulou[3], E.N. Van Loo[5], D. Puttick[2], J. Tworkowski[4], and A. Monti[1]

[1]University of Bologna, Bologna, Italy;[2]Linnaeus Plant Sciences, Canada;[3]Center for Renewable Energy Sources, Greece; [4]University of Warmia and Mazury, Olsztyn, Poland; [5]Wageningen University and Research Center, Netherlands

Camelina [*Camelina sativa* (L.) Crantz] is considered a relatively new oilseed Brassica in both Europe and North America, even though its history as a crop dates back to the Bronze Age. Almost forgotten during the worldwide expansion of oilseed rape (*Brassica napus* L.), camelina has recently received increasing interest from both the scientific community and bio-based industries around the world. The main attractive features of camelina are: drought and frost tolerance, disease and pest resistance, a unique seed oil composition with high levels of n-3 fatty acids, considerably high seed oil content, and satisfactory seed yields, in particular under low input management and in limiting environments. Within the EU project COSMOS (Camelina and crambe Oil crops as Sources of Medium-chain Oils for Specialty oleochemicals), the agronomic performance of camelina is being evaluated in a wide range of environments in Europe and, through a collaboration with Linnaeus Plant Sciences (LPS), also in Canada. A selection of improved genotypes (n=9) was tested by COSMOS partners at 4 different locations in Europe (Greece, Italy, Poland, The Netherlands) and 6 locations across Canada, covering a wide variety of soil types (from fertile clay to poor sandy) and climatic conditions (from continental cold and wet to south Mediterranean arid and continental semi-arid, with annual average precipitation ranging from less than 400 to about 800 mm). Screening trials were set up in completely randomized blocks with three or four replicates in two consecutive growing seasons (2015 and 2016) in all locations. Sowing time was optimized for each location according to the different climatic conditions. Surveyed parameters during crop development and at harvest were similar to allow for easy comparison across locations (i.e., rate of emergence, days to flowering and maturity, height at maturity, plant density at harvest, seed yield, thousand seed weight, seed oil and protein content, fatty acid profile). Camelina proved to be a highly adaptable species, reaching seed yields of ~ 1 Mg DM ha^{-1} even under the most limiting conditions (southern Greece). Growing conditions characterized by mild temperatures and adequate rainfall (Vanguard, Western Canada) resulted in seed yields of close to 2.8 Mg DM ha^{-1} in 2015. Interestingly, the length of the growing cycle varied greatly across different locations (80-110 d), but the cumulative GDD (growing degree day), values were much more stable. The performance evaluations across locations in 2015 showed that while line 13CS0787-09 reached the highest yields at the majority of sites in Europe (Italy, Greece, and Netherlands), line 13CS0787-08, which possesses up to 50% larger seed, compared to the mean of all other test entries, demonstrated high yield stability across locations in both Europe and Canada. These results suggest geographic adaptation of genotypes to some extend; however, further confirmation from the second season (2016 still ongoing) is necessary. Multi-location trials across Europe and Canada over two consecutive growing seasons serve to identify the best performing varieties in each environment which will allow defining a customized breeding program for Europe and Canada in order to establish camelina as a viable alternative in typical crop rotations.

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