Document prepared by Nerve Center of TFORD, Venture Center, Pune
Task Force on Repurposing of Drugs (TFORD) for COVID19
S&T Core Group on COVID19 constituted by PSA to GoI

Medicinal Herb Briefs: *Myrica cerifera*

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About this document: *This document summarizes information available on medicinal herb candidates for COVID19. One Medicinal Herb Brief document covers one candidate at a time.*	
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1. Summary Information on *Myrica cerifera*

Information About the Herb for Reported Indication(s)	
Common Name	Southern Wax Myrtle, Southern Bayberry, Candleberry, Bayberry Tree, and Tallow shrub
Botanical Name (Family)	*Myrica Cerifera (*Myricaceae)
Type of Plant/Source of Herbal Ingredients	Small tree Source – Bark, Leaves, Fruit, Oil https://indiabiodiversity.org/species/show/261251
TKDL Information	No mention for this Herb in TKDL
Indian Pharmacopeia Information	Not mentioned in the Indian Pharmacopeia 2018
Reported Pharmacological Effects	Anti-viral, Anti-coagulant, Anti-hypertensive, Anti-neoplastic https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5639754/ https://www.sigmaaldrich.com/life-science/nutrition-research/learning-center/plant-profiler/myrica-cerifera.html
Reported Therapeutic Target(s)	Reported for Myricanone and Myceritin (constituents of *M.cerifera*) • Inhibits NF-κB and STAT3 signaling pathways, ERK phosphorylation • Inhibitor of DNA polymerase α and I and RNA polymerase https://pubmed.ncbi.nlm.nih.gov/24299604/ https://www.sciencedirect.com/science/article/pii/S200529011300126X https://pubmed.ncbi.nlm.nih.gov/23639522/ https://www.ncbi.nlm.nih.gov/pubmed/2292590
Reported Mode of Action	Anti-cancer activity: • Myricanone (constituent of *M.cerifera*) reported to induced apoptosis in both cancer cells by triggering caspase activation, and suppression of cell proliferation by down-regulation of NF-κB and STAT3 signalling cascades https://pubmed.ncbi.nlm.nih.gov/24299604/ • Myricanone also reported to induce apoptosis in HepG2 cells through generation of ROS, depolarization of the mitochondrial membrane, early release of cytochrome-c, down-regulation of HSP70 and activation of a caspase cascade to https://www.sciencedirect.com/science/article/pii/S200529011300126X Antioxidant activity:

	• Myricitrin enhances activities of anti-oxidative enzymes and decreases the production of free radicals possibly through inhibition of phosphorylation of apoptosis signaling pathways-related kinase ERK, up-regulation of expression of anti-apoptotic proteins, and down-regulation of expression of pro-apoptotic proteins https://pubmed.ncbi.nlm.nih.gov/23833954/
Herb is reported to be beneficial for which conditions?	• Fatty Liver disease (China) https://clinicaltrials.gov/ct2/show/NCT01707914?term=myrica&draw=2&rank=1 • Herb decoction or tincture used as astringent, diaphoretic, as a circulatory stimulant, to treat irritable bowel syndrome, ulcerative colitis, digestive system disorders, diarrhea, dysentery, leukorrhea, mucous colitis, colds, stomatitis, sore throat, measles and scarlet fever, convulsions, nasal catarrh and jaundice https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4581187/table/ijms-16-17160-t001/?report=objectonly https://books.google.co.in/books?hl=en&lr=&id=e10oDwAAQBAJ&oi=fnd&pg=PT21&ots=iJWe-9C6cZ&sig=o7dYtPyzL2ly6gGi85Ys5yy-8bk&redir_esc=y#v=onepage&q&f=false *The Encyclopedia of Medicinal Plants* Dorling Kindersley. London 1996
Is the herb or its extract form used for clinical purposes?	Yes – Both
Prescribed Dose	As a juice (Chinese bayberry juice) 500 mL CBJ/day (250 mL CBJ twice daily). https://clinicaltrials.gov/ct2/show/NCT01707914?term=myrica&draw=2&rank=1
Route of Administration	Oral
Safety Profile (dose range in which it has been tested to be safe in humans)	Data not available
Adverse events/Side effects reported at the current prescribed dose	• Bayberry should not be used by pregnant and breastfeeding women, and it should not be given to infants and children. • Because the herb contains a high amount of tannin it should be used with caution, consumed in small quantities and not for long-term. • Large doses of the herb may lower the amount of potassium and increase the amount of sodium in the body, hence causing fluid retention and hypertension. People with high blood pressure, heart problems, fluid retention or poor kidney function, should not use bayberry. https://www.researchgate.net/publication/236254203_
Reported Drug-Herb interactions	Inhibition of CYP3A4 (midazolam-like) and CYP2C9 (tolbutamide-like) has been reported. Antithrombotic activity has been described for the root bark of bayberry in vitro https://www.ncbi.nlm.nih.gov/pubmed/24601222
Link to Datasheet	Data not available
Regions where Herb is found	Local Distribution: Species found locally is *M.esculenta* – Assam, Nagaland https://indiabiodiversity.org/species/show/261251
Is the Herb or Extract being sold in India?	Yes
Indian Manufacturer(s)	SBL, B Jain Pharmaceuticals (SKU: 63025), Dr Willmar Schwabe India
International Manufacturer(s)	Wuhan ChemFaces Biochemical
Cost of the Herb and Extract products in India	(₹300 for 30 ml bottle) SBL (₹135 for 30 ml bottle) B Jain Pharmaceuticals (SKU: 63025)
Information About the Major Bioactive for Reported Indication(s) **NOTE – THIS INFORMATION IS ONLY FOR THE MAJOR BIOACTIVE IN THE HERB**	
What is the Major Bioactive in the Herb?	No Major Bioactive reported Constituents reported - Myricetin, Myricanone, Myricitrin, Glycosides, Flavone,

	Glucopyranoside, β-sitosterol, Quercetin http://www.medicinalplantsindia.com/bayberry.html https://www.sigmaaldrich.com/life-science/nutrition-research/learning-center/plant-profiler/myrica-cerifera.html
Is the Major Bioactive, in isolated form used for clinical purposes?	Not Applicable
Drug Bank ID	Not Applicable
Reported Pharmacological effects	Not Applicable
Reported Therapeutic Target	Not Applicable
Reported Mode of Action	Not Applicable
Bioactive is reported to be beneficial for which conditions?	Not Applicable
Prescribed Dose	Not Applicable
Route of Administration	Not Applicable
Safety Profile (dose range in which it has been tested to be safe in humans)	Not Applicable
Adverse events/Side effects reported at the current prescribed dose	Not Applicable
Reported Drug-Bioactive interactions	Not Applicable
Link to Datasheet for Bioactive	Not Applicable
Is the Bioactive being sold in India?	Not Applicable
Indian Manufacturer(s)	Not Applicable
International Manufacturer(s)	Not Applicable
Cost of the Bioactive in India	Not Applicable
Information About the Candidate for COVID-19	
Repurposing Claim	Data not available
Rationale for Repurposing for COVID19/MoA? –	• Anti-inflammatory activity & Anti-oxidant activity: Reported for constituents like Myricanone and Myricitrin and others in cell lines and animal models of acute inflammation https://www.ncbi.nlm.nih.gov/pubmed/20383816 https://pubmed.ncbi.nlm.nih.gov/23833954/ https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4581187/ • Anti-coagulation activity: Reported for Myricetin in in-vitro studies which suggest that activity is likely due to Myricetin's inhibition of cytochrome c oxidase subunit I (COX-1). https://www.sciencedirect.com/science/article/pii/S0378874102000971?via%3Dihub
Proposed use as Primary or Adjuvant?	Primary
Pre-Clinical Data available for COVID-	• In silico study reports that Myricitrin binds to the active site of SARS-CoV-2 MPro. It also binds to other relevant targets RdRp and hACE-2

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Status of Clinical Trials	No ongoing trials
Trial Details	Data not available
Key Data from Clinical Trials	Data not available
IP Status	No relevant patent applications were identified
Other references	• https://pubchem.ncbi.nlm.nih.gov/compound/Myricitrin • https://www.sigmaaldrich.com/life-science/nutrition-research/learning-center/plant-profiler/myrica-cerifera.html • https://pubmed.ncbi.nlm.nih.gov/32299265/ • https://clinicaltrials.gov/ct2/show/NCT01707914?term=myrica&draw=2&rank=1 • http://www.medicinalplantsindia.com/bayberry.html

2. Background information

About TFORD-COVID19
The Principal Scientific Advisor to the GoI, Dr K VijayRaghavan, has constituted a S&T Core Group on COVID19. Under the aegis of the S&T Core Group on COVID19, a Task Force has been constituted focused on Repurposing of Drugs for COVID19 (in short "TFORD-COVID19"). The Task Force is being coordinated by Dr V Premnath, Head, NCL Innovations at CSIR-NCL and Director, Venture Center and Dr Anurag Agarwal, Director, CSIR-IGIB. The Nerve Center for the Coordination is located be at Venture Center, Pune (located in the campus of CSIR-NCL).

Credits
Editors: Dr. Priya Nagaraj & Dr Smita Kale; Contributors: Dr. Priya Nagaraj, Dr.Vidula Walimbe, Dr. Smita Kale, Dr. Kirtee Wani, Dr. Tejas Shah, Dr. Swati Joshi, Dr. Manisha Premnath, Dr. Premnath V; Information also contributed by Dr Gopakumar Nair, GNAS and GnanLex.

About Advisory Group
The Nerve Center at TFORD-COVID19 has constituted an inter-disciplinary Advisory Group. This Advisory Group reviews the information compiled by the Nerve Center, provides suggestions on data, information sources, organization of data etc. while also providing inputs to refine the analysis and create a structured information base to support decision-making. The Advisory Group also provides expert input and opinions on certain selected points where experience-based inputs are needed. The members of the Advisory Group for each Discussion Paper are listed at https://nclinnovations.org/covid19/teams/ .

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