

NUTRACEUTICAL PRODUCTS DEVELOPED BY CENTRAL MARINE FISHERIES RESEARCH INSTITUTE



CENTRAL MARINE FISHERIES RESEARCH INSTITUTE
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Views of technologies developed by Central Marine Fisheries Research Institute

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Background

Marine organisms have various potential applications in the area of human health. Indian coastline and EEZ is gifted with an enormous resources of valuables hidden into the depths of sea, and can be explored to develop valuable nutraceutical, pharmaceutical and biomedical products for human health and well being. CMFRI pioneered in the area of bioactive compounds from marine flora and fauna, and could able to successfully develop a number of products for use as nutraceuticals and human health (Indian Patent Appl. No. 2064/CHE/2010, 2065/CHE/2010, 2066/CHE/2010, 5198-99/CHE/2012). A patented product Cadalmin™ Green Mussel extract (Cadalmin™ GMe) containing anti-inflammatory principles from *Perna viridis* to combat joint pain, arthritis/inflammatory diseases has been developed by CMFRI as an effective green alternative to the synthetic drugs available in the market. Long term animal model experiments proved the efficiency and safety of this nutraceutical. Cadalmin™ GMe is an indigenous product, and is highly cost effective with that of the imported products available in the market. Cadalmin™ GMe has been commercialized with Accelerated Freeze Drying Company Pvt. Ltd., a FDA, ISO 22000 FSSC 22000:2011 certified flag Ship Company of Amalgam Group of Companies. The commercialization of Cadalmin™ GMe is significant to the mariculture industry and fishermen as this will enhance the demand to produce more green mussels, particularly along the west coast of India.

Cadalmin™ Green Algal extract (Cadalmin™ GAe) is another addition to the pipeline of the nutraceuticals developed by CMFRI as a natural remedy to chronic joint pain and arthritis. Cadalmin™ GAe contains 100% natural and vegetarian marine bioactive antiinflammatory ingredients, which have been extracted from a blend of marine macroalgae or seaweeds with an ecofriendly “green” technology. The mean lethal dose (LD50) of Cadalmin™ GAe is greater than 4000 mg/kg body weight of the mammalian subjects that indicate the safety of the product. As part of the further safety assessment of the extract, feeding of Cadalmin™ GAe even at a dose upto 2500 mg/kg body weight did not induce significant change in body weights, hematological indices, histopathological, and serum biochemical parameters between the control and treated groups indicating that it has no toxicity to the experimental animals. Cadalmin™ GAe was distributed to more than 500 patients suffering with chronic joint pain and arthritis, and questionnaire and clinical trial-based studies revealed that more than 98% of the respondents were satisfied with the product with about 80-85% relief in joint pain and arthritis. None of the respondents reported any side effects. The diagnostically useful autoantibody termed as Rheumatoid Factors (RFs), which are the most useful prognostic marker for rheumatoid arthritis, significantly reduced from more than 300 IU/mL to less than 30 IU/mL within a period of two to three months of consuming the product. This product has been commercialized with Celestial Biolabs Limited, a GMP/ WHO certified pharmaceutical Company based at Hyderabad.

This album highlights the capabilities of CMFRI to undertake research on health food and nutraceutical products from marine organisms, which will be of direct help to combat various diseases of human beings.



Marine flora and fauna: An unexplored resource of valuable bioactive molecules

- Rich diversity of marine organisms assumes a great opportunity for the discovery of new bioactive substances.
- Various marine natural flora and fauna such as bivalve molluscs and seaweeds have been investigated by the scientists of CMFRI for their plurality of bioactive properties.



The coastline of South Indian subcontinent is bestowed with large assemblage of bivalve shellfish particularly green mussel *Perna viridis*

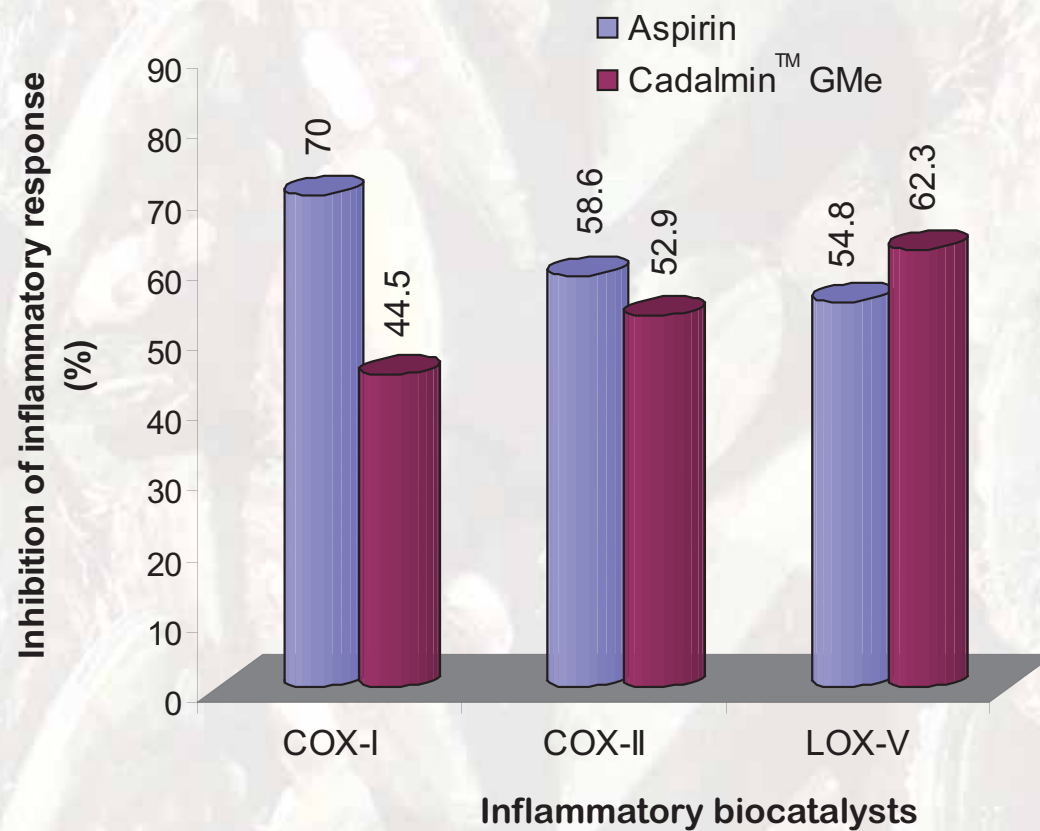
With more than 2000 identified species, the Indian coasts are acknowledged for their particular richness in seaweeds or marine macroalgae.



Cadalmin™ Green Mussel extract (Cadalmín™ GMe):
A nutraceutical product developed from *Perna viridis* for use
against joint pain and arthritis



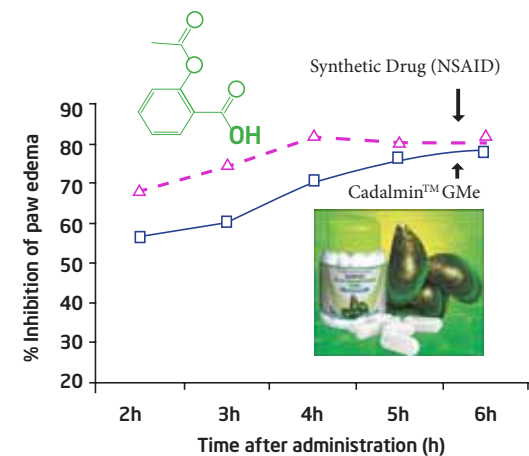
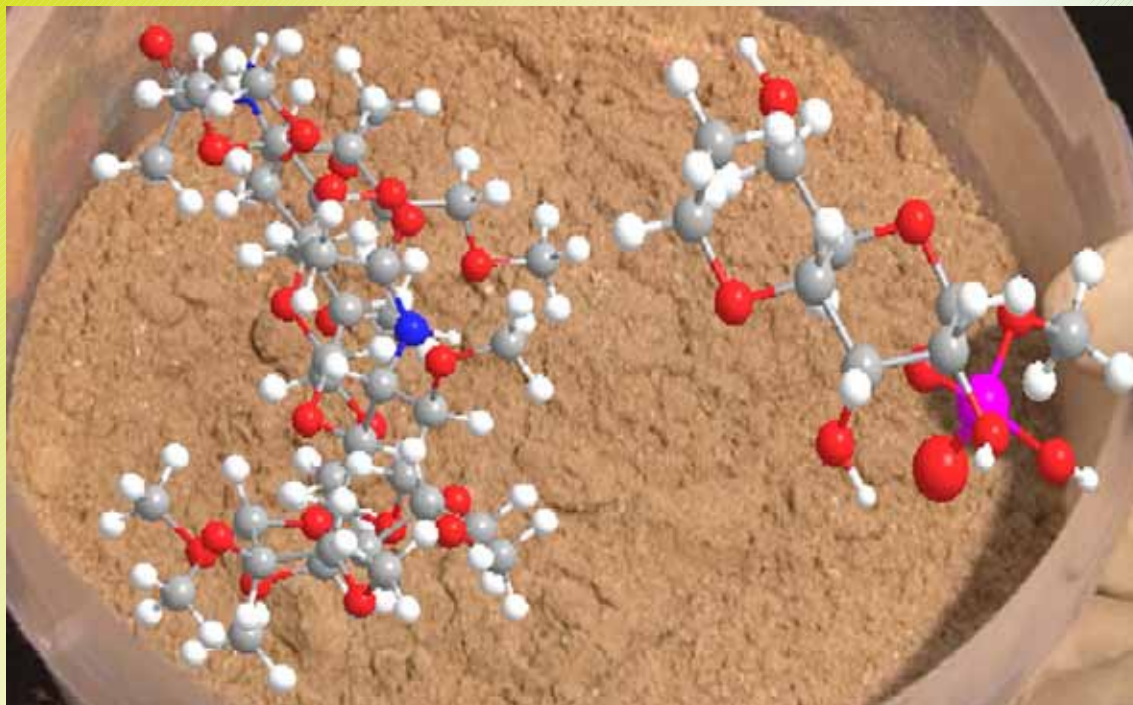
Cadalmin™ GMe contains 100% natural marine bioactive anti-inflammatory ingredients extracted from green mussel *Perna viridis* (Indian Patent Application No. 2065-2066/CHE/2010).



The active principles in Cadalmin™ GMe competitively inhibit pro-inflammatory prostaglandins and thromboxanes by inhibiting cyclooxygenases (COX I, II) and lipoxygenase (LOX V), and its activity was found to be comparable to the synthetic NSAIDs.

The active ingredients of Cadalmin™ GMe is effective to combat arthritic pain and inflammatory diseases, and is an effective green alternative to synthetic non steroidal anti-inflammatory drugs and other products available in the market.

Cadalmin™ GMe has techniques to identify the active components and to concentrate them to have higher activity; it has sustained activity due to the unique biochemical engineering methodologies adopted to develop the product.



In vivo animal model studies revealed that the active principles effectively suppressed carrageenan-induced paw edema.



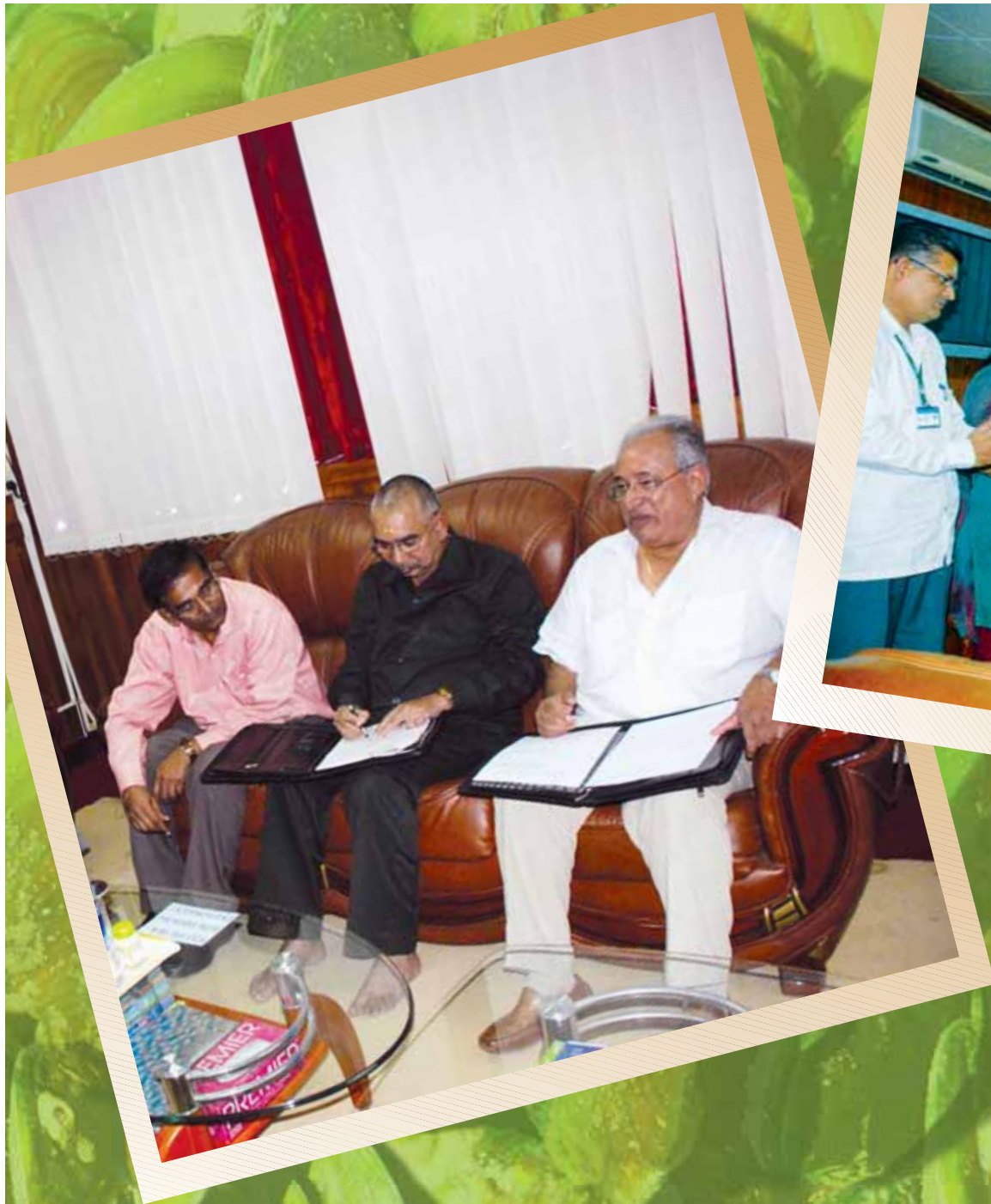


The mean lethal dose (LD_{50}) of Cadalmin™ GMe was greater than 4000 mg/kg body weight of the mammalian subjects that indicate the safety of the product. Feeding at a dose upto 2500 mg/kg body weight did not induce significant change in hematological indices, histopathological, and serum biochemical parameters between the control and treated groups indicating that it has no toxicity to the experimental animals.



Cadamin™ GMe has been commercialized on 5th October 2012 with Accelerated Freeze Drying Company Pvt. Ltd., a FDA, ISO 22000 FSSC 22000:2011 certified flag Ship Company of Amalgam Group of Companies.

Cadamin™ Green Mussel extract (Cadamin™ GMe) launched by Dr. P. Krishnaiah, IAS, Chief Executive, National Fisheries Development Board, Hyderabad, at a function held at CMFRI on 19-3-2010.

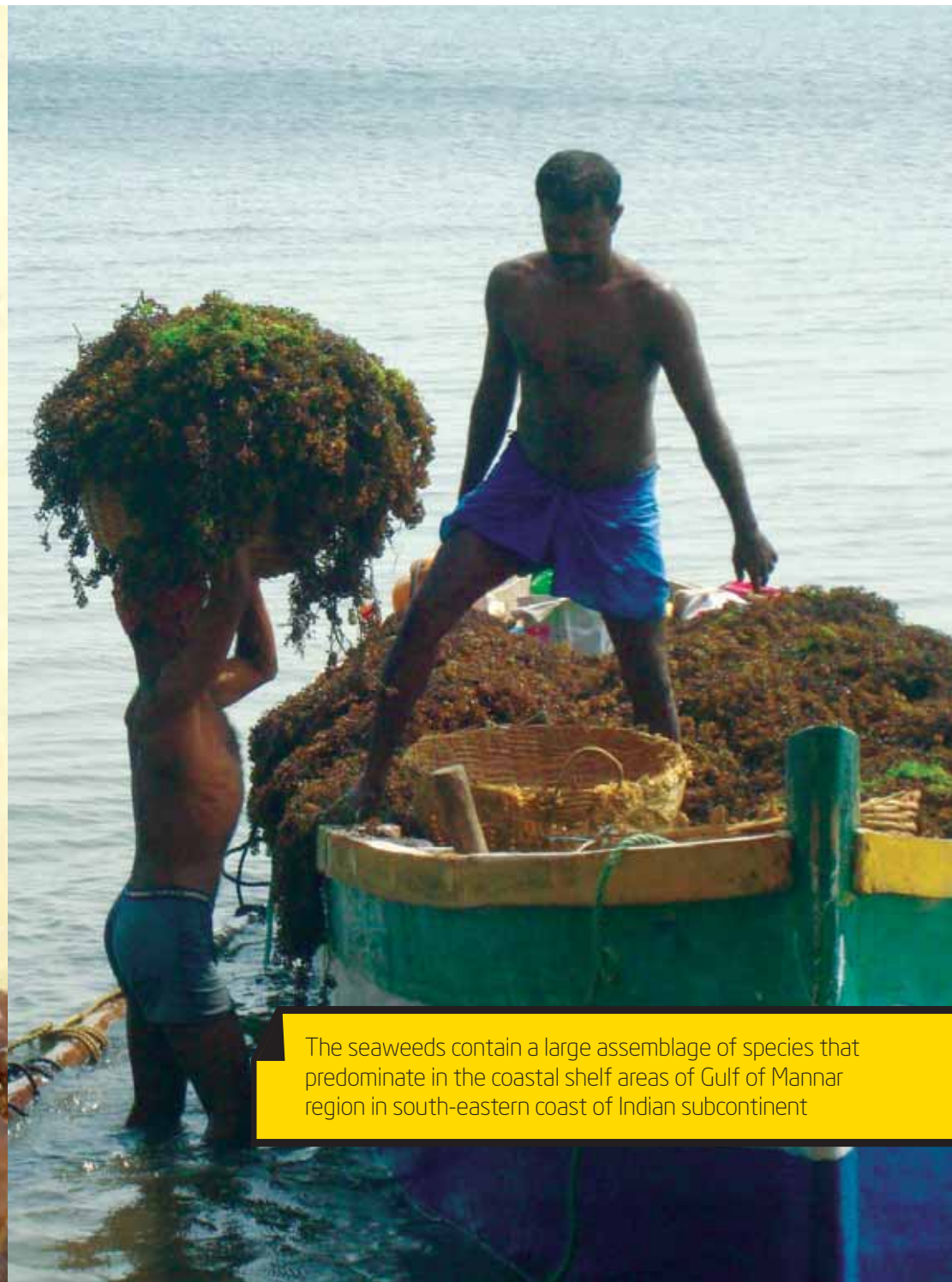


This product will be commercially produced and marketed by Accelerated Freeze Drying Company Pvt. Ltd. under their brand name

**Central Marine Fisheries Research Institute's Cadalmin™
Green Algal extract (Cadalmin™ GAe) from seaweed:**
A green solution to joint disorder arthritis



With more than 2000 identified species, the Indian coasts are acknowledged for their particular richness in seaweeds.



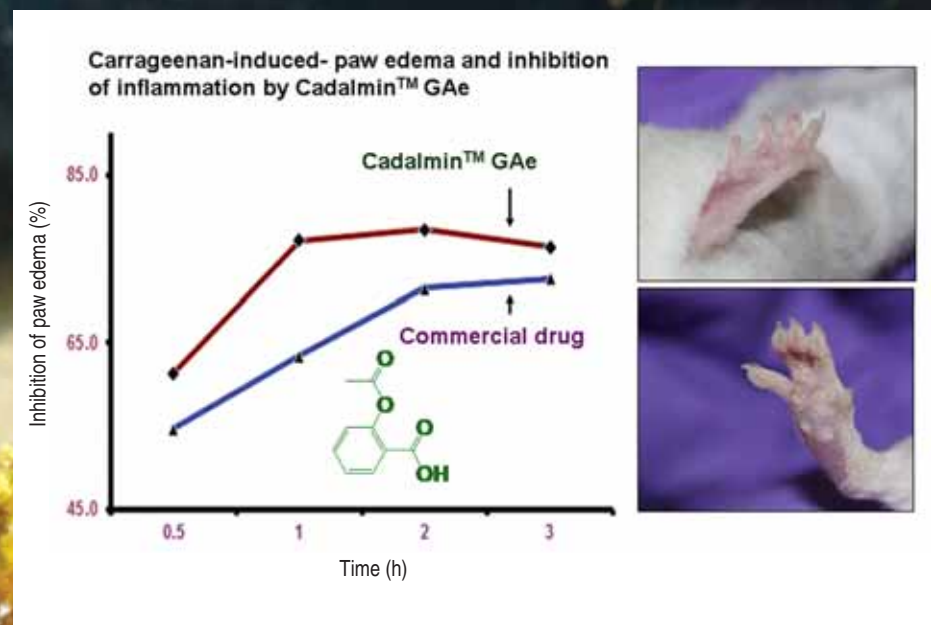
The seaweeds contain a large assemblage of species that predominate in the coastal shelf areas of Gulf of Mannar region in south-eastern coast of Indian subcontinent



Unlike terrestrial flora, seaweeds have not been explored in detail to isolate high value bioactive compounds



Animal model experiments proved the efficiency and safety of this nutraceutical. Time dependent *in vivo* animal model studies on mammalian subjects revealed the inhibition of inflammatory response to the tune of 73-76% by Cadalmin™ GAe as compared to a maximum of 70% for the popular painkiller aspirin.



Cadalmin™ GAe contains a unique blend of 100% natural marine bioactive anti-inflammatory ingredients extracted from selected seaweeds with a patented ecofriendly "green" technology (Indian Patent Appl. Nos. 2064/CHE/2010, 5199/CHE/2012).



The diagnostically useful autoantibody termed as Rheumatoid Factors (RFs), significantly reduced from more than 100 IU/mL to less than 20-35 IU/mL in the users.

The mean lethal dose was greater than 4000 mg/kg body weight of the mammalian subjects that indicate the safety of the product.





Cadalmin™ Green Algal extract has been commercialized with Celestial Biolabs Limited, a GMP/ WHO certified pharmaceutical Company based at Hyderabad for a license fee of Rs. 5 lakhs and royalty of @5% on annual sale basis for 5 years from the commencement of commercial production of the technology



Dr. G. Syda Rao, Director, Central Marine Fisheries Research Institute (CMFRI) and Dr. A.N. Singh, Managing Director, Celestial Biolabs limited, Hyderabad signed a Memorandum of Understanding (MoU) in the gracious presence of Dr. S. Ayyappan, Secretary, DARE and Hon'ble Director General, ICAR for commercial production and marketing of Cadalmin™ GAe.



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